

Pregnancy Determination in the Bitch

Jeanette L. Floss, DVM, MS

College of Veterinary Medicine, University of Missouri-Columbia

Females of most domestic species are sexually receptive (in heat or estrus) every 17 to 21 days. Failure to return to estrus after a successful breeding is often the earliest indication of pregnancy in these animals. In the bitch, the average interval between periods of estrus is seven months, regardless of whether she becomes pregnant. Therefore, non-return to estrus is not a reliable indicator of pregnancy in the canine. Palpation and radiographic or ultrasonographic imaging of the abdomen are the most common methods of detecting pregnancy in the bitch.

Abdominal palpation

Palpation of the abdomen is included in any routine physical examination of the dog. This procedure allows the experienced examiner to feel normal as well as abnormal structures within the abdomen. While the dog is standing and depending on the size of the animal, one or two hands are used to palpate the abdominal organs.

The non-pregnant uterus may be difficult to identify. With pregnancy, the uterus enlarges and can be more easily palpated.

Embryonic vesicles can be felt as early as 20 days after ovulation. Usually evenly spaced within the uterus, these spherical swellings contain the developing embryos with their associated membranes and fluids. By 20 days after ovulation, the vesicles are approximately 1 centimeter in diameter. They are more easily identified in animals that are relaxed and are not overweight. Embryonic vesicles will increase in size until 32 to 34 days after ovulation, when they are no longer identifiable as individual swellings.

Because the uterus becomes uniformly enlarged, pregnancy is more difficult to determine by palpation. An abnormal condition (pyometra, mucometra, torsion) may develop that can also cause the uterus to be enlarged. Such a condition would need to be distinguished from a pregnant uterus.

Breeding behavior will differ between bitches and mating may take place from several days before to several days after ovulation. For this reason, intervals between breeding dates and expected pregnancy-related events can vary significantly (Table 1). Pregnancy can be determined by abdominal palpation during a relatively short period of time (20 to

32 days after ovulation). If breeding dates are used to estimate the stage of embryonic development, a second examination seven to 10 days after the first may be necessary to correctly identify a pregnancy. On the other hand, if the day of ovulation can be established, then the related gestational events can be more precisely timed (Table 1). Canine pregnancies range from 64 to 66 days and are similar in length for all breeds when measured from the time of ovulation.

Table 1. Approximate time of canine pregnancy events in relation to the time of ovulation and potential fertile matings (adapted from Concannon, P. W., 1986, p. 492).

Pregnancy-related event	Number of days after ovulation	Number of days after fertile mating
Onset of estrus	-6 to +3	
First of multiple matings	-7 to +5	-12 to 0
Fertile mating	-5 to +5	0
Ovulation	0	-5 to +5
Fertilization	2 to 5	0 to 7
Vaginal cornification reduced	5 to 7	0 to 12
Embryo attachment to uterus	14 to 16	9 to 21
Vesicles visible with ultrasound	15 to 17	10 to 22
Palpable 1 cm swellings	20 to 22	15 to 27
Fetal heartbeat visible (ultrasound)	22 to 23	17 to 28
Uterine swelling visible on X-ray	28 to 30	23 to 35
Palpability of swellings reduced	30 to 32	25 to 37
Earliest X-ray pregnancy diagnosis	43 to 45	39 to 50
Fetal pelvis visible on X-ray	51 to 55	46 to 60
Fetal teeth visible on X-ray	56 to 61	51 to 66
Whelping	62 to 64	57 to 69

Ovulation is estimated to occur five to six days prior to the first day of diestrus. Diestrus is the stage of the reproductive cycle that immediately follows estrus. The first day is characterized by a dramatic change in the cells that line the vagina (see MU publication [G9922](#), *Reproductive Management of the Brood Bitch*). Daily vaginal cytology examinations throughout estrus will help to identify when this change occurs.

In addition to vaginal cytology, ovulation can be estimated by measuring serum progesterone levels. Serum levels are low prior to estrus, but elevate sharply approximately two days before ovulation. For our purposes here, ovulation will be considered as Day 0 (zero). Additional pregnancy-related events will be described in terms of the number of days since ovulation.

Radiography

Radiographic imaging (X-ray) of the abdomen is most accurate for determining pregnancy during the last trimester (43 to 63 days after ovulation). After 42 days, the fetal skulls and spines are visible on radiographs. As pregnancy advances, the bones of the front legs become visible, followed by the bones of the rear legs, the pelvis and the ribs. Finally, the fetal teeth become visible around 56 to 61 days after ovulation.

Prior to 40 days, the enlarging uterus may be visible on radiographs, but it may appear very much like the surrounding intestines. The contents of the pregnant uterus may be difficult to distinguish from an abnormal non-pregnant uterus before fetal skeletons develop. The physical and medical condition of the bitch will help to identify a diseased or a healthy pregnant uterus.

As the pregnancy nears its end, the number of fetuses can be determined radiographically by counting fetal skulls. Brachycephalic breeds (English bulldogs, Boston terriers, boxers, etc.) have an increased risk for difficult deliveries due to the size and shape of the fetal skulls. Radiographic evaluations late in pregnancy will determine if the fetuses are developed sufficiently (teeth visible) to survive and whether or not a cesarean section should be performed.

Ultrasonography

Ultrasonography is the application of high-frequency, low-intensity sound waves to various regions of the body. For the diagnosis of pregnancy, these sound waves are transmitted into the tissues of the abdomen. Different tissues reflect the waves back to the ultrasound machine, which then creates a 2-dimensional gray and white picture of the abdominal contents on a screen.

For this procedure, the bitch is placed on her back. The belly hair must be removed. A water-based gel is applied and the ultrasound transducer (probe) is then positioned on the

belly wall.

Unlike radiographs, the contents of the uterus, whether normal or abnormal, may be identified. Fluid-filled structures will appear black on the ultrasound screen. Embryonic vesicles can be visualized 15 to 17 days after ovulation. They appear as black circles, approximately 1 millimeter in diameter within the gray walls of the uterus. By 19 to 20 days after ovulation, the vesicles are approximately 3 millimeters in diameter. If the uterine wall is included in the measurement, the vesicle will measure 1 centimeter in diameter. An accurate count is not always possible because some vesicles may not be seen and others may be observed more than once during the examination.

Ultrasonographic examinations commonly will be performed 24 to 30 days after ovulation, when fetal masses and heartbeats (120 to 150 beats per minute) can be visualized within the vesicles. With the ultrasound, fetal heartbeats are visible from 22 days after ovulation through the end of pregnancy. Heartbeats are often used to evaluate fetal life when complications arise during a delivery.

Summary

Progressive events of pregnancy are listed in Table 1. The earliest that pregnancy can be detected in the bitch is 15 to 17 days after ovulation. An ultrasonographic examination is required at this stage. By 28 days after ovulation, uterine swellings can be palpated or visualized on radiographs. An ultrasonogram at this stage would identify vesicles with embryonic tissue masses and heartbeats. After 32 days, palpation is of limited value in determining pregnancy in the bitch.

Ultrasonography also is beneficial for distinguishing between abnormal uterine conditions and pregnancy. Radiographic examinations are most useful during the last trimester of pregnancy, when fetal development can be evaluated and fetal numbers can be determined.

References

Concannon, P. W. (1986). Physiology and endocrinology of canine pregnancy. In Morrow, D. A. (ed.): *Current Therapy in Theriogenology* 2. W. B. Saunders Co., pp. 491-497.

Concannon, P. W. and A. E. Yeager (1990). Endocrine, ultrasonographic, radiographic and clinical changes during pregnancy, parturition and lactation in dogs. *Proceedings of the Society for Theriogenology Annual Meeting*, pp. 197-223.

Yeager, A. E. (1991). Ultrasound examination of the female canine reproductive tract from anestrus through pregnancy to postpartum uterine involution. *Proceedings of the Society for Theriogenology Annual Meeting*, pp. 212-214.

Copyright 1999 University of Missouri. Published by University Extension, University of Missouri-Columbia. Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Ronald J. Turner, Director, Cooperative Extension Service, University of Missouri and Lincoln University, Columbia, Missouri 65211. • University Extension does not discriminate on the basis of race, color, national origin, sex, religion, age, disability or status as a Vietnam-era veteran in employment or programs. If you have special needs as addressed by the Americans with Disabilities Act and need this publication in an alternative format, write ADA Officer, Extension and Agricultural Information, 1-98 Agriculture Building, Columbia, MO 65211, or call (573) 882-7216. Reasonable efforts will be made to accommodate your special needs.