
# TRADE GENETICS

CANINE REPRODUCTION SERVICES

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# PROGESTERONE

## What is progesterone?

Progesterone is a hormone produced by the ovaries and placenta that helps to maintain pregnancy. It's main effects on tissues inside the body include: induction of an elaborate network of glands (endometrial glands) in the uterus to help provide nutrition to the early conceptus(baby) and become the maternal side of the placenta (connection between baby and mom). During pregnancy, it helps keep the uterine muscle layers relatively quiet so as not to disrupt a pregnancy. It also helps suppress the mother's immune response to its "foreign" baby as the baby grows and develop its own immune system. Progesterone also provides the stimulus to development of the glandular portions of the mammary glands (breast tissue)- it along with oestrogen and other hormones, produce the changes to breast tissue after puberty, throughout pregnancy and during nursing to allow these tissues to produce milk for babies. Progesterone enhances the effects of oestrogen on the female's brain to provide outward signs of oestrus ("heat"). This is one of the reasons why a bitch's first heat can be silent or go unobserved when there was not sufficient progesterone to prime the brain prior to the secretion of oestrogen. Progesterone, also like other steroids, can reduce the body's sensitivity to hormones like insulin that are helpful to glucose control- this is helpful to a pregnant mother with young, growing babies that require large amounts of energy as they develop into late pregnancy, but can lead to poor glucose control (gestational diabetes) in some bitches.

## When is progesterone secreted?

Progesterone is not just elevated after ovulation and throughout pregnancy. In fact, in dogs, foxes and wolves, levels of progesterone start to climb around the time of the LH peak (the brain's signal to initiate ovulation). The sites where eggs will be released (antral follicles) from the ovaries actually start to change prior to ovulation and develop small amounts of luteal (Latin word for yellow) tissue. This luteinisation of the follicles assist in follicular rupture and increases after ovulation as the cells in the ovary around the follicle, divide and continue to secrete large amounts of progesterone that will be needed to provide a uterine environment ready for embryos.
This means that progesterone will be produced in substantial amounts around the time of ovulation in the bitch and continue to rise into the first half of pregnancy.

## How does this information benefit the breeder and the veterinarian?

Well, **levels of progesterone can be measured during the early oestrus cycle of the bitch to assess the timing of the LH peak and the timing of ovulation**. Progesterone levels can have a tendency to hover at lower levels for several days then jump up which may be consistent with simultaneous ovulation of a number of follicles. Thus, it is actually much more valuable to follow the trend of progesterone levels than put stock into any one single value.
**Progesterone can also be used to confirm that ovulation did take place, but does not help in future planning of a breeding of that cycle**.

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**Progesterone can also be used to estimate the date of whelping**. Fortunately for veterinarians, dogs seem to be very consistent in the timing of whelping. On average, whelping occurs about 63 days from the point of ovulation and 65 days from the point of the LH peak (both of which are estimated by progesterone levels as mentioned above). The luteal bodies seem to have a finite lifespan and although it is not completely understood what triggers their demise, as the progesterone levels fall, whelping occurs within 48 hours. **A very useful piece of information in predicting a bitch's whelping, whether an abortion is about to occur, and in confirming termination of a pregnancy.**

## So if my bitch starts to show signs of heat today, when do I start testing?

If we are starting from the initial signs of vulvar swelling, bloody vaginal discharge and /or attractiveness to male dogs: I would generally start at day **5-6 for bull breeds** and **8-9 for the rest** unless there is a history of a short cycle or 'missing the bitch' before.

## Can you use any form of progesterone testing?

There are many forms of progesterone tests commercially available nowadays. Some tests are quantitative, meaning they give you a specific numerical value to the level of progesterone detected, and some and semi-quantitative, in that they don't give you a specific value but give you a range of values in which the sample fits best.

Of the quantitative tests, there are different methodologies used: radio-immune assay (RIA)- considered the "gold standard" of reliable testing of progesterone levels, enzyme linked absorbent assay (ELISA) and chemiluminescence(Immulite). These tests use varying technology to measure levels of progesterone in blood samples. There are a few limitations to their use. The blood samples should be assayed at the same time each day, as steroid hormone levels can fluctuate throughout the day. The blood samples must be allowed to clot and the serum separated from the clot within 2 hours, without the use of a serum separator gel. The gel in serum separator tubes can contain an ingredient that artificially lowers the level of progesterone detected. Plain red top tubes can be used for this purpose. The tests are normally run by a laboratory so, in most cases they yield information within 24 hours, but they are not immediate. They can be more expensive in some cases. **There is also some variability in levels of progesterone detected between different assays- meaning one should never try to compare progesterone levels assayed by RIA with another method like Immulite, expecting them to be comparable. It is always best to stick to one method and follow the trend.**

Of the semi-quantitative tests: most employ a colour change to indicate whether the progesterone level falls into a low, intermediate or high test range. They can be convenient for immediate assay, although they are time-consuming in clinic, they do not provide a single numerical result, they can be somewhat difficult to interpret when the value of progesterone is intermediate to 2 of the ranges listed, and the lower and upper limits may be too high or too low to be of value in all cases.

Any progesterone test used should be validated for the species used. Sometimes the cheaper test isn't so cost effective- especially if it's inaccurate!