

Reproduction in canine

canine differs from these animals in several aspects in regards to reproduction. **First**, each cycle is at least five months in duration. **Second**, the diestrus period is not changed significantly by pregnancy and is approximately the same duration. **Third**, a long period of ovarian inactivity occurs among cycles, called anestrus.

Puberty

The bitch is classified as a **monoestrous animal**. Generally speaking, the bitch has 2 breeding seasons per year. Some of the smaller breeds may have 3.

Onset of puberty in the bitch is breed-dependent, beginning between 6 and 10 months of age for bitches of many smaller breeds but may not begin for up to 24 months in bitches of some larger breeds.

Normal estrous cycle

The majority of females come into heat during March or April, and again during September or October.

The estrous or reproductive cycle of the canine includes four phases or stages which are; **proestrus, estrus, diestrus (sometimes called false pregnancy), and anestrus.**

The normal estrous cycle of the canine can be described in several different ways, including clinical findings, behavioral aspects, hormonal values, and cytological findings of the vaginal epithelium.

It is important to remember that the length of each phase of the estrous cycle in the bitch can vary from cycle to cycle.

Proestrus

The average duration of proestrus in mature bitches is **nine days**, with a normal range of 3 to 27 days. Proestrus is usually simply defined as that phase of the estrous cycle where noticeable signs of serosanguinous (thin, bloody) vaginal discharge begins (vaginal bleeding). The color of the discharge is typically bright red and voluminous at the onset of proestrus and then becomes less voluminous towards the end. The observed haemorrhage from the vulva begins as an intrauterine haemorrhage that flows through the patent cervix into the vagina in response to increasing follicular production of estrogen.

During proestrus, females are attractive to male dogs, but generally refuse mating. Sexual reflexes such as flagging of the tail (elevation of the tail away from the vulva and swaying of the hips from side to side) in response to touching the perineal region (area between and including the anus and vulva) begin in proestrus. The vulva slowly enlarges throughout

proestrus due to edematous (turgid) swelling. As proestrus progresses, this swelling gradually subsides and the vulva is less turgid.

Hormonally, the proestrous bitch is under the influence of estrogen and this is the dominant hormone during this stage of the cycle. Estrogen is responsible for most of the clinical signs seen in bitches during proestrus. The effects of estrogen dominance during proestrus are also reflected when vaginal cytology is evaluated. Exfoliated (sloughed) vaginal epithelial cells during proestrus and are usually accompanied by numerous red blood cells.

Serum progesterone concentrations during proestrus are at basal levels (<0.5 ng/mL) and then start a gradual rise at the end of proestrus.

Preovulatory follicular luteinization (transformation of the estrogen secreting follicle to a progesterone secreting structure), unique to the canine, is responsible for this increase in progesterone concentration.

Estrus

Estrus in the canine is characterized by the bitch's willingness to allow mounting and mating. The estrus phase begins with this acceptance of the male and ends when the bitch no longer permits a mating. The average duration of estrus in the bitch has been reported to be **nine days**, with a range of 4 to 24 days.

Clinically the bitch attracts males during this phase and also exhibits flagging of the tail, similar to that in proestrus. However, in estrus the vulva becomes less turgid and more soft and flaccid. The character of the vaginal discharge is also different in estrus in most bitches and is classically straw colored due to the diminishing presence of red blood cells. Some bitches, however, may continue to have a serosanguinous vaginal discharge through the estrus period.

Hormonally, the bitch appears to be receptive to the male in estrus due to declining estrogen levels and increasing progesterone levels. Serum progesterone concentrations gradually and steadily rise during estrus. At the start of estrus, progesterone concentrations are typically near 1.0 ng/ml and reach levels near 2.0 ng/ml at the preovulatory LH (Luteinizing Hormone) surge. The time of ovulation is two days later of LH surge.

The serum progesterone concentration is typically in the range of 4.0 to 10 ng/mL. Progesterone concentrations continue to rise after ovulation and reach peak levels in diestrus.

Cytologically, Vaginal cytology will have a high concentration of cornified epithelial cells with little debris.

Diestrus

Diestrus is the phase of the cycle that follows estrus and is characterized

by progesterone dominance. The duration averages 56 to 58 days in pregnancy and 60 to 100 days in the nonpregnant bitch. Diestrus is generally considered to occur clinically when the estrus bitch first refuses a mating. Bitches are also less likely to be attractive to males at this time. Progesterone secretion is maximal approximately 2 to 3 weeks after the beginning of diestrus and reach peaks of 15 to 90 ng/ml at this time. After this peak, progesterone gradually declines over the remainder of diestrus. Vaginal cytology, is no cornified cells and high numbers of white blood cells.

Anestrus

Anestrus is the quiescent phase of the canine reproductive cycle when defined by behavioral or clinical signs. Bitches in anestrus are not attractive to males and are not receptive to mating. The vulva is normally small and there is no discharge present. the onset of anestrus is not readily discernable clinically from the end of diestrus.

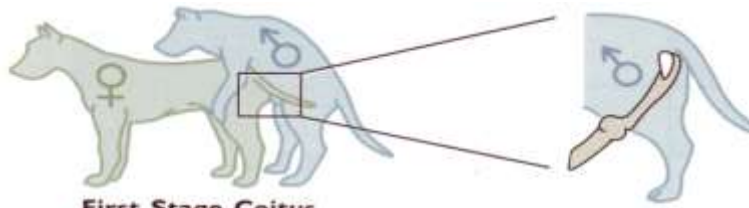
Anestrus is often defined hormonally as the phase following diestrus when progesterone levels decline to less than 1.0 to 2.0 ng/ml. The approximate duration of anestrus in the bitch is 4 to 4.5 months.

False pregnancy

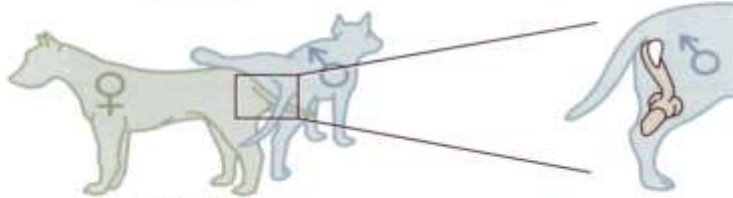
is a clinical phenomenon in which the non-pregnant female exhibits maternal behavior and physical signs of pregnancy at the end of diestrus (luteal phase). is thought to be caused by the declining serum progesterone concentrations associated with the end of the luteal phase, which in turn causes an increase in serum prolactin concentrations. Prolactin causes lactation and the maternal behavior of false pregnancy. False pregnancy, is characterized by clinical signs such as nesting, weight gain, mammary enlargement and lactation.

Mating behavior

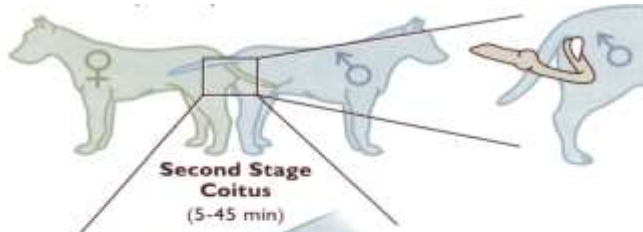
- Intromission by vigorous thrusting of hind quarters.
- Swelling of bulbus glandis in the vagina
- Vulva sphincter muscles contract around the penis forming (**the copulatory tie**).



First Stage Coitus
(1-2 min)



The Turn
(2-5 sec)



Second Stage Coitus
(5-45 min)

