# Abnormalities of the estrous cycle

Frances O. Smith, John C. Lawrence
Smith Veterinary Hospital, Inc., Burnsville, MN

**Abstract**

Veterinarians and dog breeders expect that all bitches will follow a typical estrous cycle of proestrus with serosanguinous vaginal discharge (nine days),estrus standing behavior (nine days) and diestrus (60 days). Breeders often assume that the bitch should be bred on the tenth and twelfth day of her estrous cycle. In reality proestrus can last up to 17 days, estrus can last up to 17 days and diestrus can last 56-58 days after ovulation. Beyond the typical (normal) estrous cycles a bitch may exhibit an anovulatory cycles, slow preovulatory progesterone rise, a cycle with an insufficient luteal phase, a split heat, persistent estrus or may fail to cycle.

**Keywords:** Anovulation, progesterone, split heat, luteal insufficiency, slow rise in preovulatory progesterone, failure to cycle

## Introduction

Breeding management of the bitch requires measurement of preovulatory serum progesterone in order to determine the proper time for insemination. Progesterone values are used to estimate the day of the luteinizing hormone (LH) peak (day 0) so that both timing insemination and predicting parturition dates can be accomplished.[1] It is generally accepted that a progesterone value of 2.0 ng/ml is associated with the LH surge. In theory a typical bitch should ovulate two days after the LH surge and should have fertilizable secondary oocytes 2-3 days later. Progesterone values at ovulation vary from laboratory to laboratory but generally are in the 4.0-10.0ng/ml range.

## Split heats

A split heat is a cycle in which proestrus signs of vaginal swelling and serosanguinous vaginal discharge occur without progression to ovulation followed by a brief window of apparent anestrus followed by a normal estrous cycle one to two months later. Split heats are most commonly seen with a first puberal heat cycle. The bitch is fertile during the normal portion of the cycle. Some bitches may demonstrate split heats as a manifestation of an abnormal interestrus interval.

## Silent heats

A silent heat is a cycle in which the external signs of the estrous cycle are not visible – minimal vulvar swelling or vaginal discharge but normal follicular development and ovulations. The most common cause of silent heats is owner failure to observe. Silent heats may be seen in bitches under heavy physical activity and/or training stress. This author recommends that the owner of a bitch with suspected silent heat blot the vulvar area daily for any signs of discharge and began vaginal cytology and progesterone measurement as soon as any signs are recognized. Alternatively progesterone measurements can be performed monthly to detect an unrecognized cycle. The stud dog typically will demonstrate interest in a bitch that is experiencing a silent heat.

## Slow preovulatory progesterone rise

This is the most common unusual cycle that is seen in my practice. In this type of cycle, the bitch exhibits a plateau in her progesterone rise at about 2ng/ml which persists for a number of days (three or more) and then progresses with a rapid rise consistent with ovulation. These cycles are very frustrating for both the clinician and the client who wants to know “just how many of these progesterones am I going to have to run”. The slow rise indicates that the cycle is unusual but is not necessarily an infertile cycle. To achieve good fertility these cycles often require multiple inseminations. Parturition date is more difficult to predict from these cycles because it is difficult to associate the LH peak with the progesterone value.

**Anovulation**

Anovulation is defined as the failure of serum progesterone concentrations to exceed 2ng/ml during estrus. Vaginal cytology progresses from cornified to non-cornified epithelial cells but progesterone concentration characteristic of diestrus fails to occur and the bitch enters anestrus. Anovulation is detected by a combination of vaginal cytology and every other day quantitative progesterone measurements beginning within the first five days of an estrous cycle. Anovulation can occur due to failure of the ovary to deliver enough estrogen to elicit an LH surge, insufficient gonadltropin releasing hormone (GnRH) from the hypothalamus, failure of the pituitary to secrete sufficient LH or failure of the ovary to respond to a normal LH surge. Treatment is not recommended as many bitches will cycle normally at the next estrous cycle. Some authors recommend treatment with human chorionic gonadotropin (hCG) at the subsequent cycle however that can result in persistent estrus and or pyometra.[2]

**Insufficient luteal phase**

Luteal insufficiency is the decrease in serum progesterone concentration to<2ng/ml prior to the end of diestrus. This decrease can occur from shortly after ovulation to late in diestrus whether the bitch is pregnant or nonpregnant. Without measuring serum progesterone on a routine basis, luteal insufficiency will not be identified. This author recommends measuring progesterone levels at the time of pregnancy ultrasonography if the bitch is not pregnant or if the bitch has a history of previous pregnancy loss. Luteal insufficiency is poorly documented as the cause of canine embryonic resorption or abortion although it is often investigated and suspected. Progesterone levels <2ng/ml for greater than 24 hours typically results in pregnancy loss. Progesterone replacement therapy can be administered. Progesterone in oil intramuscularly has been used to supplement progesterone but has been difficult to obtain as of this writing. Regumate® (altrenogest) at 0.088mg.kg daily can be given to support the pregnancy. This is extra –label use and should be accompanied by a signed client consent form that outlines the usage and informs the client of the risk of masculinization of female fetuses. Administration of exogenous progesterone may have less impact on the fetus when administered at day 50 or later. Quantitative progesterone assays using chemiluminnescence or radioimmunoassy do not measure altrenogest so progesterone measurements obtained while the bitch is being treated will reflect only endogenous progesterone. Exogenous progesterone administration must cease by day 60-61. The client should expect decreased lactation in bitches supplemented with progesterone.

**Persistent estrus**

Persistent estrus can be the result of exogenous or endogenous estrogen production. Persistent estrus as the result of endogenous estrogen is abnormal. The estrogen source is typically due to ovarian dysfunction but granulosa cell tumors should be considered in the differential diagnosis. Ultrasonography of the ovary may be useful but it is a challenge to confirm abnormal follicles or follicular cysts. Estrogen assays are difficult and difficult to interpret so the diagnosis of persistent estrus is based on the presence of fully cornified vaginal epithelial cells for three to six weeks or longer. Bitches with persistent estrus typically have progesterone levels in the preovulatory range<2.0ng/ml. Estrogen levels when measured in these bitches were in the normal range. In addition to the negative effect on fertility, persistent estrus can result in irreversible bone marrow suppression. The definite therapy for persistent estrus is ovariohysterectomy however most clients will ask for alternative options. Once a definite diagnosis is reached treatment may be attempted by using hCG (500-1000Units IM – repeated in 48 hours) or gonadorelin at 3.3mcg/kg once daily for three days. Responses to therapy should be assessed using vaginal cytology and progesterone measurement. The bitch should be monitored for the development of pyometra after successful treatment. Treatment failure should prompt the clinician to examine the ovaries surgically as ultrasonography may fail to identify the ovarian mass.

## Failure to cycle

The puberal estrous cycle occurs at variable ages in bitches. In breeds such as the Basenji that cycle only annually or in in sighthounds first estrus may occur up to 24 months of age. Bitches that have not cycled by 24 months of age should be examined for evidence of previous ovariohysterectomy or evidence of an abnormality of sexual development including Turner's syndrome and trisomy X.

## Summary

There is a wide timeline for the normal estrous cycle in the bitch. In order to assess true abnormalities of the cycle, history taking will be a vital tool. The client will need to commit to extensive hormonal testing in any bitch with either an unusual or abnormal cycle.

## References


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