# *Info shared by Pitbull SA.*


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## *Current issues in canine reproduction.*

**Most significant cause of infertility.**

The most significant cause of infertility is "miss-timed breeding, or failure to breed at the proper time".

The dog is defined scientifically as being monestrus, non-seasonal.

*Monestrus* in that the bitch has a single cycle: the bitch ovulates, has estrus, and then nothing for a while. Unlike horses which cycle continuously.

Non-seasonal in that the dog cycles more or less without regard to the season of the year.

In dogs there is a great deal of uterine remodeling, which becomes significant in manipulating the cycle.

The bitch begins in *pro-estrus* with swelling of the vulva, which becomes quite turgid and warm -- hence the term "heat."
In the typical cycle this proceeds for 7 - 10 days with a fairly sanguine discharge and swollen vulva.
The bloody discharge then tapers off and becomes straw colored right about the time the bitch starts to accept mating, which she will continue to do for another 7 - 8 days, after which she will no longer be receptive - *but not always*.
Some bitches will bleed for the entire cycle; there is a great deal of variation.
There is variation in the duration of each stage.
*Pro-estrus*, which typically goes 7 to 10 days, can be over in 2 or 3, or last for 2 to 4 weeks.
*Estrus* is defined behaviorally as that period during which the bitch will accept mating.
In pro-estrus the bitch is attractive to the male and will flirt with him but will not allow penetration.
That changes to a receptive behavior when she goes into estrus.

**Considerations in timing a mating.**

Variability is the first thing that gives us difficulty when it comes to mating dogs.
The vulva enlarges and softens as the bitch goes into estrus.

Right at that point she undergoes a fairly profound hormone change.
About 48 hours after onset of behavioral estrus, she has a leutonizing hormone, LH, surge and about 48 hours after that she ovulates.
Different from every other domestic species, the bitch ovulates a primary oocyte, which is still in the process of reaching that stage where it has half of the chromosomes.
It needs two more divisions before it has un-paired chromosomes.
The primary oocyte is not fertilizable for 24 to 48 hours.
Another difference for dogs is that the egg then remains fertilizable for as long as five days after ovulation.

By contrast, other mammalian ovulated eggs remain fertile for only a matter of hours.
This is important for timing.

**Timing.**

**The object is to get semen into the bitch at about the time she has ovulated.**

The sperm lasts quite a long time - **up to a week.**
Sperm are not immediately capable of fertilization; they need several hours to undergo some changes.
The goal is to have the maximum number of ready sperm about the time the egg is ready.
Traditionally, breeding is planned on the 9th through the 13th day from *pro-estral* bleeding.
This will work provided the bitch has a typical cycle;
if the cycle is not typical, **then it may not work**.
Your vet can examine the cells of the vaginal wall as it changes from a relatively thin-wall structure to a thicker wall.
This change can be seen under microscopic examination and can be used to time mating.

The end of estrus -- known as *diestrus* -- can also be observed in the cells.
The idea is to start mating at the beginning of estrus and continue mating until estrus ends.
This works well unless the bitch has a very long estrus.
We have seen entirely normal bitches remain in estrus for a month, and if one is inseminating every three days, it can get quite tedious.
(Breeding every other day is overkill.)

**Hormone monitoring.**

There is another unique canine feature.
Every other mammal ovulates and immediately starts producing progesterone.
In the dog, the progesterone goes up right before she ovulates.

And this is convenient because progesterone is easy to measure.
In the dog, we want to start insemination about two days after the progesterone begins to rise.
This happens coincidentally with a peak in Leutonizing Hormone, which is responsible for ovulation.
The LH can also be measure but it is a little harder than progesterone.

If we combine these, monitoring vaginal cells and measuring hormones, we will know that she is ready.

**Natural, AI, chilled & frozen seamen.**
Dogs can be mated naturally, or we can use artificial insemination with both the dogs present, or with chilled or frozen semen.
With a two day warning, there is time for the logistics of getting the semen.
Chilled semen works well so long as people on both ends of process know what they are doing and there are no transportation problems.
The airlines are becoming more accustomed to shipping semen.
Unfortunately, the chilled semen containers are suspicious in shape in view of security concerns, so airlines may ask to either open or x-ray.
Opening is a decided no-no as temperature control is imperative.
X-ray on the other hand is OK.
Whereas x-rays can cause profound damage during production in the testes, semen is unusually stable once produced and x-raying is OK.
It is better to x-ray than to open for inspection!
Some manufacturers of the shipping containers put lead plates in them but this is counterproductive and may cause the airline to insist on opening the container for inspection.
Frozen semen has a very grave disadvantage.
It is fertile for only a few hours after thawing and its use must be timed just right. Frozen semen will not traverse the cervix, so it must be inserted into the uterus.

Dogs have an amazingly convoluted vaginal anatomy, with the entrance to the cervix behind the dorsal median fold on the roof of the vaginal canal; so insemination must be done with a special instrument.
The technique is not yet widely used, but we are now at the threshold of being able to use frozen semen productively.
The collection and freezing of semen offers the best insurance for preserving genes **of a valuable dog**.
But, if you are thinking about this, do it before the dog is too old or gets sick, etc.
This said for the male and or the female.

**LH *vs.* progesterone testing.**

LH testing is relatively expensive and very difficult to read, with the difference between positive and negative results hard to observe.
Progesterone tests are very good and a little less expensive.

**Length of dog pregnancy.**

Variations in the length of the heat cycle, as discussed above, **affect the mating time and are largely responsible for the variation in length of pregnancy from breeding to whelping of 57 to 70 days**.
If we measure from the time of ovulation as defined by the rise in progesterone, **the time from there to whelping is very consistent at 65 days, within plus or minus one day.**

**Induction of etrus.**

Estrus **may be** induced to bring a bitch into breeding condition at a date other than her regular time.
This may be desired due to miss breeding, short availability of desired stud, or trying to get multiple bitches to synchronize their cycles.
Early work showed that it was possible to bring bitches into "behavioral" estrus **but not "fertile" estrus.**
Some bitches even ovulated but **did not** become pregnant.
Then it was discovered that the uterine remodeling was significant in understanding what was happening.
Basically, after a bitch is pregnant and has her puppies, she has to get her uterus back to normal.

She does that by shedding a lot of the uterus at about 50 days after whelping, or about 100 to 130 days after estrus.
The shedding is not particularly visible, although some discharge may be noticed.
Even when there is no pregnancy, the uterus still goes through a remodeling cycle following estrus.
A fertile estrus **cannot** be induced prior to completion of the remodeling cycle, **ending about 4 months after the beginning of the bitch's season.**
Thus, the period between estruses can be shortened to 6, 5 or 4 months, **but not shorter than that.**

**Miss-mating – What to do?**

A variety of things can be done, **but many have negative consequences for the bitch's health**.
There is little hope of another, different breeding in the same cycle.
First, she can be spayed if she is never to be bred again.
Second, a shot of estrogen about the time of miss-mating will prevent pregnancy, but only at a major cost to the bitch's health.
The release of progesterone at ovulation causes proliferation of the uterine glands to prepare for pregnancy.
If on top of that, estrogen is added, the result is a secretion in the glands which leads to cysts in the uterine wall, which is a precursor to pyometra, which is life threatening to the dog.
The complication rate is high enough to counsel against using estrogen to prevent pregnancy.
*Dr. Gilbert* prefers to wait after a miss-mating until such time as pregnancy can be diagnosed.
If the bitch is not pregnant, nothing is lost.
If she is pregnant, then she can be aborted with prostiglandins, which are relatively innocuous.

**Delaying estrus.**

There are two strategies for delaying estrus.

"Ovaban" has some of same risks as using estrogen to stop a pregnancy.
"Checkdrops" contain a male hormone that prevents ovulation and are relatively benign to other organs but can cause enlargement of the clitoris.
They can **also cause liver damage** and would not be indicated if there is a pre-existing liver problem.

**Diagnosing pregnancy.**

Progesterone goes up with or without pregnancy so this is not useful.
"Relaxin" (a polypeptide hormone) increases remarkably about 18 to 21 days after ovulation and can be tested in the blood.
Useful and nice but comes at about the same time as pregnancy can be diagnosed with the fingers.
It is useful in verifying that there was, in fact, a pregnancy in cases where the bitch seems to get pregnant but never whelps.
"Ultrasound" has improved in last 10 years to where it is a very useful tool. (Slides were shown of two week old puppies and a 35-day-old puppy.)
At 35 days, placentas, heart beats and the number of puppies can be seen; so great progress is being made in understanding fetal health and development.

**Pyometra.**

When little cysts form, the uterus becomes altered in a way that affects its defense mechanism.
A healthy uterus rejects bacteria and has a remarkable ability to clear infection.
The uterus itself is naturally sterile but there are lots of bacteria in the vagina and the formation of cysts is a precursor to the situation where the uterus is unable to defend itself from bacteria.
In the normal course of events, the progesterone elevation causes the cervix to shut off the uterus from infection and isolate the uterus for the puppies to develop.

With the cysts, the progesterone still shuts off the uterus, but if there is already infection, it is able to grow within the uterus and the dog gets sicker and sicker.
Pyometra generally presents about a month after estrus.
The uterus can be treated but it will **never** go back to normal.
If you must breed such a bitch, breed her at the next estrus and every subsequent estrus after that until she completes her breeding career, and then spay her.
Each time she goes through a non-pregnant estrus cycle she has another chance to get pyometra again.
She will ultimately relapse unless spayed.
The extent of damage can be diagnosed by surgical biopsy, with the normal concerns attendant to cutting the bitch open.
Cysts will not be visible on ultrasound until they reach the millimeter range.

**Male dog breeding frequency.**

A male can service females perhaps as many as four times in one day but a sustainable frequency would be three times a week.
**Note to breeders!** >> If you come under pressure with bitches, remember the sperm last longer than we tend to think, so breeding a bitch every third day instead of every other day may help accommodate the situation.

**Questions & answers.**

In response to a question as to whether heartworm medications affect pregnancy, *Dr. Gilbert* was not aware of any effects.
Asked about criteria for resorting to C-section, *Dr. Gilbert* commented that one can prepare in advance by x-raying to determine whether size is an issue.
Beyond that, his rule of thumb is that, if the bitch strains vigorously for 20 minutes or halfheartedly for an hour, without making progress, he would do something; not necessarily surgery, but he would want to figure out what is going on.
Dogs can have one or two pups and then quit for a while - normal.

The most common problem is not a size mismatch but rather a uterine contraction problem.
Unfortunately, the pressure on the vet is to err on the side of performing the C-section, in that if the vet advises waiting and there is a negative outcome for either mother or puppies, then the vet is to blame.
Dogs **need calcium** late in pregnancy but they **can also get too much**.
Panting can cause dog to bind up her calcium.

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