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# Reproductive Management of the Brood Bitch

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All dogs, male and female, that are to be housed in a breeding colony should receive a nutritionally balanced diet and annual vaccinations for distemper, hepatitis, leptospirosis, parainfluenza and parvovirus. Annual or three-year rabies vaccinations also should be maintained in accordance with local municipal regulations.

The dogs should test negatively for Brucellosis before being presented for breeding. Brucellosis is an infectious disease that may cause infertility in males and females as well as the abortion of litters around 45 to 55 days of pregnancy. There is no effective treatment for this disease and no vaccine. Animals that test positively should be removed from the breeding colony.

After a bitch reaches puberty between six and 24 months of age, she will be sexually receptive (in heat or estrus) twice a year. The average period between heats is seven months. Heats may occur any time of the year and last an average of nine days (range 3 to 21 days). Besenji bitches are an exception and are in heat only once each year, usually in the fall.

The reproductive cycle in the bitch has four phases that must be recognized to ensure proper breeding management. These phases are influenced by hormones, which are responsible for the changes in the reproductive tract and behavior in the bitch.

Estrus is preceded by a nine-day period called proestrus (range 0 to 17 days) in which the reproductive organs are being prepared for mating and conception. This period is dominated by increasing levels of the hormone estradiol, which causes swelling of the vulva. A blood-tinged discharge is often seen at this time. This discharge results from the action of estradiol on the vessels of the uterus allowing blood to leak into the uterus.

The male dog may be attracted during proestrus, but the female usually will not permit him to breed. Late in proestrus a second hormone, progesterone, begins to increase while estradiol begins to decline. The combination of these two events is responsible for the bitch demonstrating receptivity to the male. She will permit him to mount, will deviate her tail and permit breeding.

Decreased swelling of the vulva, cessation of the bloody discharge and acceptance of the male are characteristics of estrus (heat). Following estrus, the bitch enters diestrus. The beginning of this phase is characterized by the refusal of the male. Progesterone will remain elevated during diestrus in the pregnant or non-pregnant bitch for almost 60 days.

Diestrus is followed by a period of sexual inactivity (anestrus). The length of this cycle phase varies from one female to the next but usually lasts for several months.

Many bitches will not fit into the "average" cycle (Figure 1). Therefore, proper management of the individual brood bitch is required to ensure a fertile mating and the delivery of a litter of pups. Sexual behavior differs greatly between bitches and by itself is not a reliable means of monitoring cycles. Greater accuracy in the timing of breeding can be achieved by combining behavioral observations with daily vaginal cytologies and measurements of serum progesterone levels.

**Figure 1. Hormonal changes and reproductive events of the cycling bitch (adapted from Olson and Husted, 1986, p. 466).**

Monitoring vaginal cytology and serum progesterone levels should begin after the first day of proestrus. The vaginal lining changes in response to estradiol levels and the cell types presented are characteristic for the different stages of the reproductive cycle. During proestrus and early estrus, the number of layers of cells increases as much as tenfold and the most superficial cells are altered to resemble those much like the outer layer of skin. These changes are necessary to protect the reproductive tract during mating.

Late in estrus with the decline in estradiol levels, the vaginal lining quickly returns to normal. Progesterone levels are low during proestrus. Late in proestrus, serum progesterone begins to increase. Maximum fertility occurs between four and six days following this initial increase.

When the bitch enters proestrus, she should be presented to a veterinarian for an initial examination. At this time, the first of several sequential samples can be collected for vaginal cytology and an initial serum progesterone level can be established. The materials required to collect daily vaginal cytology samples can be obtained from a veterinarian and include: clean microscope slides, glass or plastic vaginal speculum and cotton swabs.

The technique for collecting these cytology samples should be demonstrated by a veterinarian before it is attempted at the breeding kennel. A clean glass microscope slide with one frosted end should be labeled in pencil with the name of the bitch and the date of the sample. The speculum with a cotton swab is introduced into the vaginal canal (Figure 2a). The swab is advanced through the speculum and lightly twisted one to two full turns in one direction and withdrawn (Figure 2b).

The speculum should be cleaned and disinfected after each use. The swab is then gently rolled across the prepared microscope slide several times (Figure 3) and allowed to dry. The slides may be held in this manner or may be fixed by dipping in methanol and again

allowed to dry. Every second or third day, these slides are returned to the veterinarian for staining and interpretation.

Several commercial kits for measuring serum progesterone levels are available for veterinary use. Serum samples should be collected daily from the onset of proestrus until the initial rise is detected. Each bitch should be exposed to a male only when the vaginal cytology demonstrates she is in estrus. Cytologic estrus and elevated serum progesterone levels correlate with increased conception rates.

Additional breedings should take place at three- to four-day intervals as long as the vaginal cytology samples indicate the bitch is still in heat. When the cytology sample indicates that diestrus has begun, breeding should cease. If she becomes pregnant, the bitch should be expected to whelp 56 to 58 days from the first day of diestrus.

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