

## Interpretation of Serum Progesterone Results for Management of Breeding in Dogs

### Endocrine Section, Diagnostic Center for Population and Animal Health, Michigan State University

November 3, 2008

Prepared by Dr. Kent Refsal, with input from Drs. Cheri Johnson, Ray Nachreiner, Patricia Schenck, and MaryDee Sist

The rationale for use of serial progesterone assays is that increases of progesterone begin in close proximity to the preovulatory surge of gonadotropins in dogs and continue through ovulation and estrus. Estimates of the proximity of ovulation and time of optimal fertility are made from monitoring the increase of progesterone and the magnitude of the serum concentration. Listed below are guidelines used in interpretation of progesterone results. These guidelines are based on the premise of cytological changes of vaginal epithelium that are indicative of estrus.

In comparing progesterone results from different sources, be aware that progesterone concentrations may be reported in units of 'ng/ml' or 'nmol/L'. To convert results into similar units, use the following:

Progesterone in ng/ml x 3.18 = Progesterone in nmol/L

Progesterone in nmol/L ÷ 3.18 = Progesterone in ng/ml

#### Ranges of Progesterone Results and Their Implication for Breeding (‘Days’ refers to the number of days after collection of the sample)

Concentration of Progesterone	Estimate for Ovulation (no. of days)	Estimated Time for Breeding (no. of days)
0-2 nmol/L	Baseline concentration, too early to estimate ovulation	Not applicable
3-6 nmol/L	Minimum of 2 days before ovulation is expected. Results of 3-4 nmol/L may persist for a week or longer before increasing	Earliest estimated window for breeding is from 4-6 days, but could be longer
7-12 nmol/L	Minimum of 1 day before ovulation is expected	Estimated window for breeding is from 3-5 days, but could be longer
13-18 nmol/L	Ovulation is impending or has just occurred	Estimated window for breeding is 2-4 days
19-31 nmol/L	Ovulation recently occurred	Estimated window for breeding is 1-3 days
32-64 nmol/L	Ova have matured, optimal potential for fertility	Estimated window for breeding is 0-2 days
65-90 nmol/L	Ova have matured but aging, decreased potential for fertility	Breed at once (0-1 days)
>90 nmol/L	Too late or very reduced potential for fertility	

**Sample Collection (\*\*Avoid serum-separator tubes\*\*)**— There is recognition that concentrations of progesterone in canine serum are lowered with the use of serum-separator tubes, with suspicion that progesterone is absorbed by the gel material. This effect is worsened with prolonged holding of the sample in the separator tube after centrifugation. Also, blood should be centrifuged shortly after clot formation and serum separated from the clot.

**Summary** – The use of serial monitoring of progesterone in bitches has proven to be an invaluable diagnostic tool for management of breeding. There is great variation among bitches as to the time interval from onset of proestrus until the initial rise of progesterone and then variation in the rate of increase. To be confident that ovulation is impending or has just occurred, sampling should be repeated until a result of or greater than 15 nmol/L has been obtained. Optimal fertility is anticipated when serum progesterone is between 30-65 nmol/L at the time of breedings.