

TIMING OF OVULATION FOR OPTIMUM BREEDING EFFICIENCY IN CANINES

Bibin Becha B., Aravinda Ghosh and Sreekumaran T.

Canine breeding is emerging as a fast growing profitable venture in the field of animal husbandry. Since the reproductive cycle is limited to one or two in an year, a unique feature in canine reproduction, the key step in scientific dog breeding is to obtain maximum fertility and prolificacy in every cycle and there by to obtain maximum returns.

The normal reproductive efficiency is the sum of several unique features of reproductive physiology in canines. The oestrus period in bitches is prolonged, averaging 9 days (range 3 to 21 days) preceded by a naturally prolonged proestrus and they will allow the stud dog to mate for several times over several days during an oestrus period which ensures conception. More number of ova (ranging from 5 to 15) are produced in a cycle and are viable for more than four days after ovulation. It may be fertilized by sperms which can survive in the female genital tract for a prolonged period of 4 to 11 days after a single mating. In spite of all these factors which favour conception, an increased number of animals which fail to conceive are being presented to the veterinarians for fertility management. Inadequate breeding management plays an important role in failure or lowered conception in canines. Exact timing of ovulation is necessary when insemination using chilled or frozen semen is being carried out where the lifespan of the spermatozoa is compromised due to several inevitable adverse factors or conditions.

Optimum time for mating or insemination can be obtained by predicting the time of ovulation for obtaining maximum fertility. Several methods can be used with varying success rates for timing of ovulation in bitches.

Exfoliative vaginal cytology is a simple and reliable method for predicting the time of ovulation. Vaginal epithelium changes from a bistratified cuboidal epithelium to a multilayered squamous epithelium in progression to oestrus along with the

rise in level of oestrogen in the circulation. Usually the first mating or insemination is advised when more than 80 per cent of the superficial epithelial cells become anuclear squamous cells. The second mating or insemination is advised when a further 10 per cent increase in the level of squamous cells is noticed. Superficial cell index, Karyopyknotic index and Eosinophilic index derived from exfoliative vaginal cytology can also be used for predicting the time of ovulation. But in some cases vaginal cytology may indicate complete epithelial cornification and this picture persists throughout the stage of oestrus without indicating days of ovulation or the best day to achieve maximum fertility. In some cases, there may be failure to attain 80 per cent or above cornification level which also create problems in predicting the time of ovulation using exfoliative vaginal cytology.

Vaginal discharge forms a typical ferning pattern during oestrus due to the increase in level of ions (especially Na^+ and Cl^- ions) in the vaginal mucus. This increased level of ions produce a typical crystallization pattern of vaginal smear, which can be utilized effectively for timing of ovulation in bitches. There will be a rise in level of glucose in vaginal discharge nearer to ovulation. Estimation of level of glucose in vaginal discharge using colour sensitive strips can be employed quickly and effectively for timing of breeding in canines. Electrical resistance of vaginal secretions measured using a commercial vaginal resistance probe is useful for predicting the fertile period.

Measurement of serum LH concentration using commercial ELISA kits (Status-LH) is a reliable and accurate method for determining the optimum mating time. Mating or inseminations can be performed between four and six days after the LH peak. Since LH peak concentrations in circulation persist for a limited period, sampling of serum for LH

assay should be done daily to detect the day of LH surge.

Prospective determination of ovulation can be achieved by means of serum progesterone estimation. In canines, there is rise in level of progesterone two to three days prior to ovulation due to preovulatory luteinization of follicles. So quantitative or qualitative determination of progesterone (RIA / EIA) using commercially available kits are effective for this purpose. When previous reproductive history of the bitch is unknown, the first blood sample should be drawn 4 to 6 days after the onset of proestrus. If the progesterone concentration is less than 1.0ng/ml, the next sample should be drawn in every 3 to 4 days until an interpretable concentration of 1.0 to 8.0ng/ml is detected. Mating or insemination can be advised when the progesterone concentration reaches 4.0 to 8.0ng/ml.

Real time diagnostic B-mode ultrasonographic monitoring of the development of follicles is another method for assessing the mating time in bitches. In general, it is difficult to identify ovulation because follicles do not collapse and the echogenicity changes are not so consistent. Follicles measure about 2 to 3mm in diameter in early to mid proestrus, about 5mm in late proestrus and reach a maximum size of 7 to 10mm by the day of LH surge to the day of ovulation. Although this is a non-invasive method, this requires costly equipments and much expertise which hinders its routine use in field practice.

Endoscopic assessment of appearance of vaginal mucosa can also be used for timing of ovulation in bitches. Entire vaginal mucosal surface is lined by longitudinal furrows and inter-furrow folds. These folds are low in anoestrus, become large, rounded, oedematous and prominent during proestrus and become wrinkled and shrunken during oestrus. At the end of oestrus these folds become flattened. Changes in the prominent dorsal medium fold can be used for timing of ovulation. Additional wrinkles or indentations become progressively obvious during the preovulatory LH surge. Eventually the large round mucosal folds are subdivided into smaller rounded crumbled folds and round peaks. Because of the

continued withdrawal of water retention effect of oestrogen, there is a progressive increase in mucosal shrinkage, wrinkling and sharpness of wrinkled folds, which is termed as crenelation. Immediately after ovulation at mid-oestrus, the angulated folds with sharp peaks on smaller wrinkles give a fluted appearance, which is the optimum time for mating or insemination.

Although several techniques are described for timing of ovulation in bitches, exfoliative vaginal cytology combined with quantitative or qualitative estimation of progesterone can be employed effectively for timing of ovulation and thereby achieving successful breeding in canines under field practices. The techniques like ELISA based serum LH determination and endoscopy require much expertise and are more costly and time consuming which limits their use only in research and referral institutions.

References

- Becha, B.B., Ghosh, K.N.A. and Sreekumaran, T. (2009). Timing of ovulation in bitches during induced oestrus cycle. In: Proceedings of the 21st Kerala Science Congress. pp. 138 – 140.
- Concannon, P.W. and Lein, D.H. (1989). Hormonal and clinical correlates of ovarian cycles, ovulation, pseudopregnancy and pregnancy in dogs. In: Current Veterinary Therapy: Small Animal Practice, Vol X., Ed. Kirk, R.W., W.B. Saunders Company, Philadelphia. pp. 1269 – 1282.
- England, G.C.W. (1992). Vaginal cytology and cervico vaginal mucus arborisation in the breeding management of bitches. J. Small Anim. Pract. 33: 577 – 582.
- England, G. and Concannon, P.W. (2002). Determination of the optimum breeding time in the bitch: Basic considerations. In: Recent Advances in Small Animal Reproduction. Ed. Concannon, P.W., England, G., Verstegen, J and Linde-Forsberg., International Veterinary Information Service, New York.
- Hayer, P., Apel, G.A.R., Luerssen, D. and Hoppen, H.O. (1993). Ultrasonographic monitoring of

follicular development, ovulation and the early luteal phase in the bitch. J. Reprod. Fert. Suppl. 47: 93 – 100.

Jeffcoate, L.A. and Lindsay, F.E.F. (1989). Ovulation detection and timing of insemination based on hormone concentrations, vaginal cytology and the endoscopic appearance of the vagina of domestic bitches. J. Reprod. Fert. Suppl. 39: 277 – 287.

Sridevi, P., Nambi, A.P., Prathaban, S. and Pattabiraman, S.R. (1999). Optimum time of mating of dogs based on vaginal cytology or qualitative progesterone assay. In: Proceedings of XV Annual Convention and National Symposium on Biotechniques in

Authors

1. Dr. Bibin Becha B.
Assistant Professor

2. Dr. Aravinda Ghosh K.N.
Professor and Head

3. Dr. Sreekumaran T.
Retd. Head of Department

Department of Animal Reproduction,
College of Veterinary and Animal Sciences,
Mannuthy
Kerala.
