

## **Monitoring the late pregnant bitch to determine readiness for caesarean section**

Carolynne J. Joonè<sup>1</sup>, Kurt G.M. De Cramer<sup>2,3</sup>

<sup>1</sup>Discipline of Veterinary Science, College of Science and Engineering, James Cook University, Townsville, Queensland, 4811, Australia

<sup>2</sup>Rant en Dal Animal Hospital, Mogale City, Gauteng, 1751, South Africa

<sup>3</sup>Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, 0110, South Africa

Keywords: Dog, progesterone, elective caesarean section, Catalyst progesterone, vaginoscopy

### **1. Introduction**

Caesarean section (CS) in the bitch is a commonly performed procedure in veterinary practice. For breeds or individual bitches prone to neonatal losses and dystocia with vaginal birth, owners may request elective CS. Data suggest that CS is safe if performed within around 48 hours of spontaneous parturition.<sup>1-3</sup>

### **2. Predicting a pregnant bitch's whelping date**

In order to ensure that a CS is performed within the safe window of 48 hours before spontaneous whelping would have begun, a precise and accurate due date is required. Predicting a bitch's due date based on the date(s) of mating is unreliable, given the long lifespan of fertile, fresh spermatozoa in the reproductive tract of the bitch.<sup>4</sup> For bitches attending a veterinary clinic for breeding management, various timepoints can be used to predict the subsequent due date, notably the date of the LH surge, the date that circulating progesterone concentration (PC) first exceeds 6 nmol/L (approximating to the LH surge), the date that PC first exceeds 16 nmol/L (approximating to ovulation), or the first day of cytological dioestrus.<sup>5</sup>

### **3. Determining readiness for caesarean section in late pregnancy**

Many bitches, however, present to veterinary clinics during pregnancy, without clinical data pertaining to the previous oestrus available. In such cases, determining the bitch's due date requires the use of alternative tools. Ultrasonographic measurement of the conceptus provides a useful guide, with multiple formulae available for determining gestation length based on a variety of measurements in an increasing array of breeds and breed sizes.<sup>6</sup> Once parturition is more imminent, many practitioners rely on the measurement of PC, a practice based on the well-established drop in progesterone concentration over the last few days of gestation in the bitch.<sup>7</sup> Nöthling, Joonè and De Cramer<sup>8</sup> showed that a late pregnant bitch with a PC of  $\leq 8.7$  nmol/L has a 95% chance of entering Stage I of labour within 48 hours,

while a bitch with a PC  $\leq 3.18$  nmol/L has a 91% chance of entering Stage I of labour within 24 hours. However, approximately 5% and 10% of bitches will enter Stage I of labour within 12 hours despite a PC above 15.8 nmol/L and 8.7 nmol/L, respectively. Additional work by our group compared the IDEXX Catalyst point-of-care progesterone assay to the Immulite 2000.<sup>9</sup> More recently, a PC threshold to indicate readiness for CS in the late pregnant bitch, assayed using the IDEXX Catalyst progesterone, has been validated (manuscript under review).

#### 4. Conclusion

Additional tools are frequently used to evaluate the pregnant bitch and her unborn litter, such as the monitoring of foetal heart rates or foetal intestinal motility through ultrasonography.<sup>10</sup> Visualisation of the closed or dilating cervix using a simple vaginal speculum is strongly encouraged, given that around 10% of bitches will enter Stage I of labour despite a PC above the traditional threshold of around 6 nmol/L.<sup>3, 9, 11</sup> When utilising PC for clinical decision-making, practitioners should be aware of rare instances of bitches with PC values approaching baseline levels, well beyond 48 hours prior to the onset of spontaneous labour.<sup>9, 12, 13</sup>

#### References

1. Baan M, Taverne M, Kooistra H et al. Induction of parturition in the bitch with the progesterone-receptor blocker aglepristone. *Theriogenology* 2005;63:1958-1972.
2. Levy X, Fontaine E, Segalini V, Fontbonne A. Elective caesarean operation in the bitch using aglepristone before the pre-partum decline in peripheral progesterone concentration. *Reprod Domest Anim* 2009;44:182-184.
3. De Cramer KGM, Nöthling J. Curtailing parturition observation and performing preparturient cesarean section in bitches. *Theriogenology* 2019;124:57-64.
4. Concannon P, Whaley S, Lein D, Wissler R. Canine gestation length: variation related to time of mating and fertile life of sperm. *Am J Vet Res* 1983;44:1819-1821.
5. De Cramer K, Nöthling J. The precision of peri-oestrous predictors of the date of onset of parturition in the bitch. *Theriogenology* 2017;96:153-157.
6. Lopate C. Gestational aging and determination of parturition date in the bitch and queen using ultrasonography and radiography. *Vet Clin-Small* 2018;48:617-638.
7. Smith F. Challenges in small animal parturition—Timing elective and emergency cesarian sections. *Theriogenology* 2007;68:348-353.
8. Nöthling JO, Joonè CJ, De Cramer KG. Use of serum progesterone and prostaglandin F2 $\alpha$  metabolite levels to predict onset of parturition in the bitch. *Reprod Domest Anim* 2022;57:635-642.
9. Nöthling JO, Joonè CJ, Hegarty E, Schooley EK, De Cramer KG. Use of a point-of-care progesterone assay to predict onset of parturition in the bitch. *Front Vet Sci* 2022;9:914659.
10. Milani C, Artusi E, Drigo M et al. Ultrasonographic analysis of fetal gastrointestinal motility during the peripartum period in the dog. *Anim Reprod Sci* 2020;219:106514.
11. De Cramer KGM, Nöthling J. The precision of predicting the time of onset of parturition in the bitch using the level of progesterone in plasma during the preparturient period. *Theriogenology* 2018;107:211-218.

12. Austad R, Lunde A, Sjaastad Ø. Peripheral plasma levels of oestradiol-17  $\beta$  and progesterone in the bitch during the oestrous cycle, in normal pregnancy and after dexamethasone treatment. *Reproduction* 1976;46:129-136.
13. Onclin K, Verstegen J. Secretion patterns of plasma prolactin and progesterone in pregnant compared with nonpregnant dioestrous beagle bitches. *J Rep Fer S* 1997;51:203-208.