

## **Pregnancy Ketosis in the Bitch**

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Pregnancy ketosis in the bitch is a poorly documented phenomenon either as an entity by itself or in association with dystocia. This paper reviews 15 bitches that were presented to Applecross Veterinary Hospital for dystocia between April 2002 and February 2004.

All bitches were subjected to clinical, vaginal and ultrasound examination at presentation. Vaginal examination did not reveal mal-positioned or mal-presented pups as a cause of dystocia. All bitches had readily detectable breath ketones. Caesarean sections (C-sections) were performed based on a combination of bitch status, previous whelping history and/or detectable foetal distress based on ultrasonographic detection of heart rates less than 150 beats per minute and foetal gut movement.

Prior to anaesthesia induction a peripheral venous blood sample for each bitch was collected for haemogram and biochemistry profile including electrolytes, progesterone and D-3-hydroxy butyrate (D3OHB). Progesterone was measured by a reference laboratory using chemiluminescence on an Immulite system. D3OHB was measured by a reference laboratory using the Ranbut assay by Randox. Results were received the day after the C-section.

Anaesthesia was induced with intravenous propofol and maintained with inhaled isoflurane oxygen. Intravenous fluids 0.45% NaCl and 2.5% glucose were administered intra-operatively. Surgery was performed by midline laparotomy and ventral hysterotomy. All bitches received buprenorphine intra-venously during surgery after removal of the final pup but prior to recovery and anti-biotics. All bitches were discharged from hospital within 6 hours of surgery. Follow up examination was performed at two weeks after surgery.

All bitches survived C-section. All pups that were detected alive on ultrasound examination prior to C-section were delivered alive and survived at least until follow up examination. A total of 71 live pups were delivered. Three bitches had a total of 6 pups without heartbeats on ultrasound examination that were delivered dead.

The mean serum concentration of D3OHB was greater ( $\bar{x} = 1.61 \text{ mmol L}^{-1}$ ) for the affected bitches compared to normal levels of serum D3OHB (0.00-0.05  $\text{mmol L}^{-1}$ ). Total serum  $\text{CO}_2$  concentrations as an indirect measure of acid/base status were not significantly different from the normal range indicating that these bitches were ketotic but not keto-acidotic.

Mean serum progesterone concentration of  $5.01 \text{ nmol L}^{-1}$ . At serum progesterone concentrations less than  $6 \text{ nmol L}^{-1}$  pregnancy is not sustainable and parturition should

have commenced. This finding indicates that the timing of C-sections were not premature with respect to ovarian function.

Of the 15 bitches only one bitch had serum glucose levels below normal range suggesting that hypoglycaemia at the time of parturition may not be a contributing factor to the dystocia.

There was no significant difference between mean serum calcium concentrations of the affected bitches and the mean of the normal range suggesting that hypocalcaemia was not a contributing factor to the dystocia.

Twelve of the fifteen bitches were under 10kg bodyweight at the time C-section.

Further studies are being undertaken to investigate if this disturbances of energy metabolism prior to parturition contributes to dystocia in the affected bitches and if so can dystocia be avoided by dietary manipulation during the latter stages of pregnancy in those bitches at risk.