Ovarian color-Doppler ultrasonography to predict ovulation in the bitch


Faculty of Veterinary Medicine, Utrecht University, Utrecht, the Netherlands; Department of Veterinary Clinical Sciences, Louisiana State University, Baton Rouge, LA; Audubon Center for Research of Endangered Species, New Orleans, LA; Department of Animal Sciences, Louisiana State University, Baton Rouge, LA

A non-invasive and rapid technique to detect the ovulation day in real time for bitches is desirable to determine optimum breeding time. The objective of the study was to determine if color-coded Doppler ultrasonography could be used to identify the ovulation day in the bitch. The hypothesis was that blood flow in the ovary would increase at ovulation and be detected by color-coded Doppler ultrasonography. Ten adult, Walker-type hound (~20 kg) bitches housed at the Louisiana State University School of Veterinary Medicine had a single subcutaneous deslorelin implant (Ovuplant, Wyeth Animal Health, Guelph, Ontario, CA) inserted into the vulvar mucosa to induce estrus. Seven of the ten had normal estrous cycles that were subsequently followed. The estrous cycles were monitored by vaginal cytology and serum progesterone every other day until day one of cytologic diestrus. After the vaginal cytology was 100% cornified, trans-abdominal color-coded Doppler ultrasonography was performed daily, by the same operator, using a 7.5 MHz linear transducer (My Lab50, Esaote, Universal Ultrasound, Bedford Hills, NY, USA) to determine intra-ovarian blood flow. Progesterone values were not known during ultrasonography. A subjective scoring system for quantification of ovarian vascular perfusion was used (1 to 4). The LH surge was assumed to have occurred on the day that progesterone first exceeded 2.0 ng/mL and was considered day zero, with ovulation assumed to occur two days after the LH surge. From a total of 84 ultrasonographic examinations, images were obtained 84.5% and 83.3% of the time of the left and right ovaries, respectively. PROC MEANS, PROC FREQ, and PROC CORR were used for the analysis (SAS version 9.1, SAS, Cary, NC). The relationship between days after the LH surge and the score was explored using Spearman’s rank correlation for each dog. The overall significance of the relationship was explored using Cochran-Mantel-Haenszel methods, stratifying over dogs. Significance was considered at P < 0.05 for all data unless noted otherwise. The homogeneity of scores across -1 d to +2 d was further analyzed using a Chi square analysis. Where there was significance, pair-wise comparisons between days were performed using Fisher’s exact test with significance determined at P < 0.02 to reduce type I error. There was an association of days after the LH peak and the ultrasonographic score for the left (p < 0.001) and right ovaries (p < 0.001). Differences were found for scores on only the right ovary on -1 d to +2 d (p < 0.001) (left ovary P = 0.20), -1 d and 0 d (P = 0.006), and -1 d and 2 d (P = 0.014), with higher scores on 0 d and 2 d than on -1 d. Color Doppler ultrasonography provides complementary information about cyclic changes, showing an increase in ovarian blood flow around ovulation.

Keywords: Ovulation; color Doppler; blood flow; progesterone; vaginal cytology

Acknowledgement

Supported by a grant from Audubon Center for Research of Endangered Species