

Accuracy of whelping date calculator based on fetal ultrasonographic measurements

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Gestation length in the bitch is 65 (+/- 1) days from luteinizing hormone (LH) peak. Prediction of whelping date can be fairly accurate within a 3-day window when proper progesterone monitoring is performed. An accurate due date is desirable as some breeds are known to have higher rate of dystocia and elective cesarean section needs to be planned. In cases where progesterone monitoring has not been performed and an LH peak date could not be estimated, ultrasonographic measurements of the fetus and gestational sac have demonstrated high accuracy to predict the gestational age.¹ These formulas require the sonographer to manually calculate and average the results in order to provide useful information. It is therefore desirable to have a computerized online whelping calculator application that a practitioner can input fetal measurements and immediately obtain a predicted whelping date. Our objective was to develop and validate a whelping calculator application that will generate a predicted whelping date based on fetal ultrasound measurements. The purpose of our study was to test our hypothesis that the current formula used in the website application will be able to predict the whelping date to within a 3-day window based on ultrasound measurements.

Methods

A webpage (https://vetapp-sb.vet.cornell.edu/whelping_calc) was created by the Cornell Veterinary Medicine Information Technology based on the mathematical formulas previously published by Yeager et al.¹ To test the performance of the website, a retrospective study design was used. Data of fetal ultrasonographic measurements were obtained from medical records of patients (n=14) with known whelping date; or known date of emergency or elective cesarean section (progesterone <2ng/mL) to test the calculator. Fetal measurements used for the calculators were: crown-rump length (n=11); biparietal diameter (n=3); fetal trunk/abdomen diameter (n=11), inner-chorionic cavity (n=7) and outer-chorionic cavity (n=10).

Results

The average gestation from the progesterone based presumptive LH peak was 65.7 ± 2.0 days, and 65.1 ± 1.5 days based on ultrasonographic predicted LH peak. There was a significant linear relationship between ultrasonographic predicted gestational age and progesterone based LH peak gestational age (0.557 ± 0.224 , $P=0.037$ JMP Pro 13). In this preliminary study population, the accuracy to predict whelping date within the 3-day due date window was 40% for progesterone based due date and 64.3% based on ultrasonographic based due date. If the window of accuracy were extended to predict whelping within +/- 2 days from the predicted due date, the accuracy was 70% for progesterone based due date and 85.7% for ultrasonographic based due date. All bitches whelped within +/- 3 days of either predicted due dates.

Discussion/conclusions

Ultrasonographic measurement is significantly correlated with progesterone based due dates and can be a very useful tool to predict whelping dates especially in cases where progesterone monitoring was not performed. Further development and validation of this free web application is underway with more retrospective cases being collected and additional prospective studies are being planned.

Keywords: Canine, ultrasound, fetus, LH whelping calculator

Reference

1. Yeager AE, Mohammed HO, Meyers-Wallen V, et al: Ultrasonographic appearance of the uterus, placenta, fetus, and fetal membranes throughout accurately timed pregnancy in Beagles. *Am J Vet Res* 1992;53:342-351.