Article 127

Detection of Gestational Age and Days Before Parturition Using Ultrasonography in Canines

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Twenty pregnant bitches admitted to Central Veterinary Hospital Srinagar for routine pregnancy checkup were included in the present study. All the bitches were scanned twice, before and after 40th day of gestation. Before 40 days of gestation, gestational age (GA) was calculated using gestational sac diameter (GSD) and after 40 days of gestation, gestational age was calculated using head diameter (HD). Days before parturition (DBP) was calculated as: (65 days – GA). Less than 40 days of gestation the average GSD ranged between 1.2 to 3.3 cm with mean 2.39 ± 0.15 cm and GA ranged between 27.2 to 39.8 days with mean 34.34 ± 0.90 days and DBP ranged between 25.2 to 37.8 days with mean 30.66 ± 0.90 days. More than 40 days of gestation the average HD ranged between 1.5 to 2.4 cm with mean 1.92 ± 0.06 cm and GA ranged between 42.5 to 56 days with mean 48.87 ± 1.0 days and DBP ranged between 9 to 22.5 days with mean 16.12 + 1.0 days.

KEYWORDS
Pregnant, pregnancy, checkup, gestation, bitches, ultrasound.

INTRODUCTION

Ultrasonography is one of the modern diagnostic tools to detect reproductive tract status of canines. It is gaining popularity as it is quick, reliable and safe to make early pregnancy diagnosis possible besides permitting an assessment of the viability and growth rate of fetuses at the same time (Goddard, 1995). It is extensively used to diagnose pregnancy (Nyland and Mattoon, 2002) and being noninvasive and with almost no side effects on mother and fetuses, it can be used repeatedly to study foetal growth during gestation period. The major problem in accurately determining the day of whelping from last mating is non-co-ordination with internal endocrine events such as LH surge. Hence gestational length varies from 63 ± 7 days from mating. In bitches, gestational length from LH surge is fairly constant (65 ±1 day). Thus it makes difficult to predict day of whelping (Bhardwaj, 2008). Foetal age, which can be used to predict parturition dates, can be estimated with reasonable degree of precision from foetal measurements made by scanning with modern ultrasound machine. The images on the screen can be frozen and measurements of the fetuses can be taken using electronic calipers. These measurements can be used for predicting foetal age. Such a prediction of foetal age and expected time of parturition would be advantageous in breeding establishments and in bitches with multiple and uncertain mating. Pregnancy diagnosis at early stage contributes to better management of pregnant bitches leading to healthy pups and no loss of litters (Gulavane, 2001).

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MATERIALS & METHODS

The present study was carried out at Central Veterinary Hospital Srinagar (J & K). Ultrasonographic evaluation was carried out in 20 bitches bought for pregnancy diagnosis. All these bitches were randomly examined twice, before and after 40 days of gestation. Before 40 days, gestational age (GA) was calculated by measuring gestational sac diameter (GSD) and after 40 days, gestational age (GA) was calculated by measuring head diameter (HD). The foetal structures in pregnant animals were

identified, frozen and then measurements were taken using electronic calipers. The sonographic foetal age was calculated using formulae given by Nyland and Mattoon (2002). The gestational age (GA) was calculated as :

(a) Less than 40 days GA (days) = [6 X Gestational sac diameter] + 20

(b) Greater than 40 days GA (days) = [15 X Head diameter] + 20 and

Days before parturition (DBP) = 65 – gestational age (GA).

The bitches were prepared for sonography by clipping hairs on the ventral abdomen and were preferably kept with full bladder as it can be used as an acoustic imaging window to locate the uterus. All the bitches were examined in dorsal, left and right lateral recumbancy. An ultrasound coupling gel was applied on the abdomen to increase the conductivity and ultrasound was started from caudal end and probe was moved cranially to scan entire abdomen. Coupling media was applied on the skin surface to ensure an intimate contact between the transducer and body surface. The images on the monitor were frozen, different measurements were recorded and the images were stored on the computer. Three types of images were observed on the monitor.

Hyper-echoic: Brighter/ white colored images – more reflection of sound waves indicating the solid medium or tissue e.g. bone.

Hypo-echoic: Greyish white images – moderate to less reflection of sound waves indicating the thick liquid or loose tissue e.g. visceral organs.

Anechoic: Black colored images – no reflection of sound waves indicating the watery or thin liquid medium e.g. bladder, gestational sac.

RESULTS

The gestational age (GA) and days before parturition (DBP) before and after 40 days of gestation are illustrated in Table I and Table II. From Table I it is clear that average gestational sac diameter (GSD) ranged between 1.2 to 3.3 cm with mean 2.39 ± 0.15 cm and gestational age (GA) ranged between 27.2 to 39.8 days with mean 34.34 ± 0.90 days and days before parturition (DBP) ranged between 25.2 to 37.8 days with mean 30.66 ± 0.90 days and from Table II it is clear that average head diameter (HD) ranged between 1.5 to 2.4 cm with mean 1.92 ± 0.06 cm and gestational age (GA) ranged between 42.5 to 56 days with mean 48.87 ± 1.0 days and days before parturition (DBP) ranged between 9 to 22.5 days with mean 16.12 ± 1.0 days.

DISCUSSION

Sonographic evaluation of pregnant animals before the 40th day of gestation revealed average gestational sac diameter (GSD) ranged between 1.2 to 3.3 cm, gestational age (GA) between 27.2 to 39.8 days and days before parturition (DBP) between 25.2 to 37.8 days, while sonographic evaluation after 40th day of gestation revealed average head diameter (HD) ranged between 1.5 to 2.4 cm, gestational age (GA) between 42.5 to 56 days and days before parturition (DBP) between 9 to 22.5 days. The observations of Concannon and Lein (1989), Son et al. (1997) support the present findings. Similar findings on DBP were observed by Nyland and Mattoon (2002). In light of the present findings and earlier reports it can be inferred that gestational age (GA) before 40th day of gestation in bitches can be calculated using gestational sac diameter (GSD) and after 40th day of gestation can be calculated using head diameter (HD) and DBP can be calculated as (65 – GA).

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TABLES

Table I. GSD, GA and DBP (mean± se) < 40 days of gestation

S.no	GSD(cm)	GA (days)	DBP(days)
1	1.2	27.2	37.8
2	1.5	29	36
3	1.9	31.4	33.6
4	2.3	33.8	31.2
5	2.2	33.2	31.8
6	1.3	27.8	37.2
7	1.4	28.4	36.6
8	2.4	34.4	30.6
9	2.9	37.4	27.6
10	2.8	36.8	28.2
11	3.1	38.6	26.4
12	3.3	39.8	25.2
13	3.2	39.2	25.8
14	2.4	34.4	30.6
15	2.8	36.8	28.2
16	3.3	39.8	25.2
17	2.9	37.4	27.6
18	1.9	31.4	33.6
19	2.6	35.6	29.4
20	2.4	34.4	30.6
Mean ± SE	2.39 ± 0.15	34.34 ± 0.90	30.66 ± 0.90

Table II. HD , GA and DBP (Mean± SE) > 40 days of gestation.

S.no	HD(cm)	GA (days)	DBP(days)
1	1.5	42.5	22.5
2	1.6	44	21
3	1.5	42.5	22.5
4	1.8	47	18
5	1.5	42.5	22.5
6	1.9	48.5	16.5
7	1.5	42.5	22.5
8	1.9	48.5	16.5
9	2.3	54.5	10.5
10	1.9	48.5	16.5
11	1.8	47	18
12	1.9	48.5	16.5
13	2.3	54.5	10.5
14	2.4	56	9
15	2.1	51.5	13.5
16	2.2	53	12
17	1.9	48.5	16.5
18	2.0	50	15
19	2.1	51.5	13.5
20	2.4	56	9
Mean ± SE	1.92 ± 0.06	48.87 ± 1.0	16.12 ± 1.0

TABLES

Fig 1. GSD less than 40 days of Gestation

Fig. 2 HD more than 40 days of Gestation