

Effect on Gestation Length of Litter Size, and Inter-Pup Interval, Change of Rectal Temperature in German Shepherd and Labrador Retriever Bitches

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Abstract: The objective of the current study was to investigate duration of gestation, inter-pup interval and rectal temperature during peripartum period in German Shepherd Dogs and Labrador Retriever bitches in the special care unit of dog in Bursa. The study was performed on 30 bitches of two breeds. Estruses were determined according to acceptance of the male for mating. Bitches were examined in dorsal recumbency between days 25 and 30 of gestation without sedation. Pregnancy was confirmed by ultrasonography in all dogs. Gestations length was ranged from 58-64 days. There were 62.6±1.5 and 61.6±2.0. days in German Shepherd dogs and Labrador Retriever bitches respectively. The time between birth of the first puppy and the second puppy ranged between 20-415 min, and 5-405 min in German Shepherd Dogs as compared with the labrador bitches. Length of the expulsion phase was calculated as 7.49±2.44 (3.5- 14.8 h) and 7.38±1. (4.08-11.11 h) respectively, in German Shepherd Dogs and Labrador Retrievers. Litter size did not have an effect on duration of gestation in the bitches (P>0.05). Rectal temperature was calculated as 38.27±0.04 °C at 24 h before expulsion of the first pup and 37.43±0.06 °C at onset of whelping. Mean rectal temperature, 24 h after parturition, calculated as 38.27±0.04 °C was significantly higher (P<0.001) than the temperatures measured prior to whelping. As a result, regarding with acceptance of the male for mating, gestation length did not differ in German Shepherd and Labrador Retriever bitches and rectal temperature decreased before the onset of whelping and increased following parturition. Mean gestation length were not significantly affected by litter size.

Keywords: Bitches, gestation length, inter-pup interval

Labrador Retriever ve Alman Çoban Köpeklerde Rektal Isı Değişimi, Doğan Yavrular Arasındaki Süre ve Yavru Sayısının Gebelik Süreleri Üzerine Etkisi

Özet: Sunulan çalışmada, Alman Çoban ve Labrador Retriever ırkı köpeklerde rektal ısı değişimleri, yavru sayıları ve doğan yavrular arasındaki süre ve gebelik süreleri üzerine etkileri araştırılmaktadır. Çalışma, Bursa ilinde özel bir köpek barınağında, iki farklı ırktan toplam 30 adet köpek kullanılarak gerçekleştirildi. Çiftleştirmeler vaginal sitoloji ve erkeğin kabulüne göre yapıldı. Yapılan çiftleştirmeler sonrası 25-30. günler arasında transabdominal ultrasonografi ile gebelik tespit edildi. Köpeklerde doğum ilk çiftleştirmeleri takiben 58-64 günler arasında gerçekleşti. Ortalama gebelik süresi Alman Çoban ırklarında 62.6±1.5 gün ve Labrador Retriever ırklarında 61.6±2.0. gün olarak belirlendi. Doğan yavrular arasındaki süre ise Alman Çoban ırklarında 20 ile 415 dakika arasında gerçekleşirken, Labrador ırklarında bu süre 5-405 dakika arasında gözlemlendi. İlk yavrunun çıkışı ile son yavru çıkışındaki süre (doğumun ikinci aşaması) Alman Çoban köpeklerde 7.49±2.44 ve Labrador Retriever ırkı köpeklerde ise 7.38±1.75 saat olarak belirlendi. Yavru sayısının gebelik süreleri üzerine de etkisinin olmadığı saptandı (P>0.05). Rektal ısı ilk yavrunu doğumundan 24 saat önce 38,27±0.04 °C, doğumundan hemen sonra 37.43±0.06 °C olarak ölçüldü (P<0.001). Sonuç olarak; Vaginal sitoloji ve dişinin ilk kabulü ile yapılan çiftleştirmelerde her iki ırkta gebelik süreleri 60-61 gün arasında gerçekleşmiştir. Doğum öncesi rektal ısının düştüğü ve doğum tamamlandıktan sonra tekrar yükseldiği yapılan ölçümlerde saptanmıştır. Bir batımda doğan yavru sayısının gebelik sürelerini etkilemediği sonucuna varıldı.

Anahtar kelimeler: Köpek, Gebelik süresi, Yavrular arası süre

Introduction

Predicting day of whelping can be difficult, because canine gestation length from a single breeding can range from 57 to 72 days. In additions, many bitches are bred of possible whelping dates is great (Johnston et al., 2001). An accurate timing of parturition is very useful for managing canine parturition.

It is generally accepted that parturition in bitches occurs between 64 and 66 days after the luteinizing hormone peak (Mir et al., 2011). Actual gestation length in the bitch is 65±1 days when from the preovulatory LH surge in peripheral blood. However, apparent gestation length can vary by as much as 14 days (57-72 days) (Kutzler et al., 2003). Sixty three days after ovulation, and 57

days after the onset of cytology diestrus. For example, gestations length, when defined as the length of time from the day of first mating to the day of whelping, has been shown to range from 57-72 days. (Johnston et al., 2001).

There are many situations in the clinical field or, for research purposes, in which an accurate determination of impending parturition in pregnant bitches is required (Veronesi et al., 2002) Several authors (Concannon et al., 1978; Concannon et al., 1983; Concannon et al., 1989; Veronesi et al., 2002; Olsson et al., 2003) have studied prepartum hypothermia in bitches as a method for estimating the parturition time in pregnant bitches. Tsutsui and Murata (1982) found that the interval between the time when body temperature decreased to 37.5°C in the late stage of pregnancy and the onset time of parturition was characterized by small individual differences among the bitches concluded that this interval should be of great practical value as a criterion for the prediction of the onset time of parturition. Williams et al. (1999), reported the interesting finding that, in the bitch, postpartum mean rectal temperatures were higher than prepartum rectal temperatures. Concannon et al (1977) determined transient hypothermia between 12 and 24 h before the onset of parturition. Pups are usually delivered every 30 minutes to 1 hour until whelping is completed, the interval can be variable, with up to 4 hour between the births of pups in some eutocic bitches. Although stage II of labor is usually completed within 6 hour, delivery of entire litter, especially when large, can extend to hours without obvious complications (Johnston et al., 2001).

The objective of the present study was to investigate duration of gestation, inter-pup interval and changes of body temperature during peripartum period in dogs. We also investigated whether the number of fetuses affects the duration of gestation.

Materials and Methods

This study was conducted in 30 bitches of two breeds 17 German Shepherds and 13 Labrador Retrievers in the special care unit of dogs in Bursa. The bitches weighed between 25 and 30 kg. They were housed singly indoor-outdoor runs, fed a standard commercial dry food once daily and given water ad libitum. The dogs were examined 08.00 h every day for the presence of swelling of the vulva and a serosanguineous vaginal discharge, which were considered to signify the onset of prooestrus. Bitches were caged 1 h period one day intervals at the onset of the prooestrus. Vaginal smears for cytology were taken every other day during

prooestrus. Smear preparation were according to papanicolaou (Papanicolaou, 1942). Estrus was characterized by estrus behavior (positive postural reflexes) and a vaginal superficial cell index >85%. All bitches mated according to acceptance of the male for mating.

The day of mating was considered to be day 0 of gestation. Transmission gel was applied copiously to the ventral abdomen and the hair was clipped. Bitches were examined in dorsal recumbency between days 25 and 30 of gestation without sedation. Pregnancy was confirmed by ultrasonography in all dogs (Scanner 2000, Pie Medical from 5 to 7.5 mHz linear prob). Gestation lengths were calculated as the interval from the estimated first mated day to the day of parturition. On day 50 of gestation, the bitches were moved into the whelping kennels to become accustomed to the new environment. When parturition was close the bitches were observed for signs of imminent parturition such as restlessness, panting, nesting, vomitus, anorexia and bedding. The bitches were observed from onset of parturition, until 48 h after parturition, without disturbing. The number of pups born was counted within 12 h after expulsion of last pup.

Body temperature was taken daily from on day 50 of pregnancy to 48 h after parturition. It was estimated using a thermometer for pediatric use which was inserted into the rectum and held there for 5 min and data collected. All bitches were calculated inter-pup interval from the birth of the first puppy after the birth of the last puppy, rectal temperature changes of the bitches in the peripartum period and gestation length according to first mated. Statistical analysis was performed using SPSS for windows, version (10.0 (SPSS).) All bitches were compared with Independent-Samples *t*-test between the number of puppies and the gestation length. Rectal temperatures were using a parried-samples *t* test. Data is expressed in text and mean \pm S.E.M. $P \leq 0.05$ was considered significant.

Results

All the bitches whelped without assistance Gestations length (intervals from the first mated to parturition) ranged from 58-64 days. mean (\pm S.E.M.) interval from first mating to parturition in German Shepherd and Labrador Retriever bitches mated according to acceptance of the male were 62.6 ± 1.5 and 61.6 ± 2.0 . days, respectively. With regard to gestation length, no significant difference was found (Table 1). The time between birth of the first puppy and the second puppy ranged between 20-415, and 5-405 min in German Shepherd as

compared with the Labrador Retriever bitches. No significant difference was found between two breeds. Regarding the length of the expulsion phase, it was calculated as 7.49 ± 2.44 (3.5-14.8 h) and 7.38 ± 1.75 h (4.8-11.11 h), Respectively (Table 1). The interval from the first mated to parturition averaged 61.1 ± 1.2 and 60.8 ± 1.9 days for litters of 5-7 (n=19), 8-9 (n=11) pups. There were no

differences between for litters of 5-7 and 8-9 pups in the number of fetuses and the duration of gestation ($P > 0.05$). Litter size did not have an effect on duration of gestation in the bitches. However, reductions in the number of fetuses have been observed in parallel to the age increases (Table 2).

Table 1. Gestation length, duration of the expulsion phase and inter pup interval

Breed	n	Age (years)	Length of gestation (days)	Length of the expulsion phase (h)	Intervals expulsion of pup (min)	Total pups
German Shepherd	17	4.57 ± 1.35 (2-6)	62.6 ± 1.5^a	7.49 ± 2.44	20-415	125
Labrador Retriever	13	3.83 ± 2.04 (3-6)	61.6 ± 2.0^b	7.38 ± 1.75	5-405	110

a,b, Indicates values no significantly different ($P > 0.05$).

Table 2. Relationship between litter size and gestation length in the bitches

Bitch (n=30)	Age years	Number of pups	Length of gestation (days)
n=19	5.2 ± 1.5	5-7	61.1 ± 1.2^c
n=11	3.5 ± 1.1	8-9	60.8 ± 1.9^d

Indicates values no significantly different ($P > 0.05$).

Rectal temperature was calculated as 38.27 ± 0.04 °C at 24 h before expulsion of the first pup and 37.43 ± 0.06 °C at onset of whelping. Mean rectal temperature, 24 h after parturition, calculated as 38.27 ± 0.04 °C was significantly higher ($P < 0.001$) than the temperatures measured prior to whelping. The mean rectal temperatures started to increase between 24 and 48 h after expulsion of the last puppy and reached nadir of 38.59 ± 0.05 °C at 48 h after expulsion of the last puppy. Rectal temperature was vary until time; 0 at the onset of whelping. The mean temperature was 38.53 ± 0.04 before 144 h parturition. A significant decrease as compared with time 0 (37.43 ± 0.06 °C). ($P < 0.001$).

Discussion

Accurate prediction of parturition date is useful for clinical management of canine parturition (Kurtler et al., 2003). However, apparent gestation length can vary by as much as 11 days (58-69 days) when timed from the first of multiple matings (Concannon et al., 1983). In the current study, parturition occurred between 58-64 days in the bitches. Gestation lengths were 62.6 ± 1.5 and 61.6 ± 2.0 days (mean \pm S.E.M) in German Shepherd, Labrador Retriever bitches, respectively. Okkens et al., (2001), also reported that the duration of gestation varied between 58-65 days with a mean of 61.4 ± 1.5 days. The mean duration of gestation in West Highland White

Terriers (62.8 ± 1.2 days) was significantly longer than that of German Shepherds (60.4 ± 1.7 days) and Labrador Retrievers (60.9 ± 1.5 days). Regarding with gestation length in German Shepherd and Labrador Retriever, no significant differences was found according to acceptance of the male for mating. Our findings agree with the observations of Okkens et al., (2001). Tsutsui et al., (2006) also reported that intervals from mating to parturition in bitches mated 1-3 days after ovulation were 63.4 ± 0.6 , 61.6 ± 0.7 , 60.8 ± 0.7 days, respectively. Olsson et al (2003) reported that intervals between the expulsion of the first puppy and the second puppy ranged between 35-100 min in the beagle bitches. In the present study, inter-pup intervals occurred between 20-415 and 5-405 min in German Shepherd and Labrador Retriever bitches. This difference can be attributable to species difference, high litter size and tiring of bitches. Okkens et al., (2001) reported that the number of fetuses and the duration of gestation were negatively correlated. In contrast, there was no correlation in the present study agreed with the observations of Kutzler et al., (2003), although in the present study the duration of gestation appeared longer in animals with fewer fetuses. The interval from the first mated to parturition averaged 61.1 ± 1.2 and 60.8 ± 1.9 days for litters of 5-7 (n=19), 8-9 (n=11) pups. Within each breed, litter size had no influence on the gestation length. However, the number of litter size reduced due to age increases in the bitches.

Approximately 14 h after parturition, luteolysis with a drop in serum progesterone < 1 ng/ml, a transient and abrupt hypothermia can be detected. Rectal temperature decline at least one full degree and often to <37.2°C (Johnston et al, 2001). Refinetti and Piccione (2003), The average rectal temperature of the dog is considered to be 38,9°C. Baan et al., (2005) reported that changes of the mean rectal temperature in the spontaneously whelping and induced with aglepristone group did not differ significantly. However, mean rectal temperatures started to decline between 40 and 48 h before expulsion of the first pup and after parturition, mean rectal temperatures were significantly higher than the temperatures measured prior to the whelping. Similarly, rectal temperatures decreased until expulsion of the first pup and started to increase after 24 h expulsion of the last pup and increase until 48 h after parturition. Expulsion of the luteal phase usually is completed within 6 hour, delivery of an entire litter, especially when large, can extend to 24 hours (Johnston et al., 2001). In this study, Regarding the length of the expulsion phase, it was calculated as 7.49 ± 2.44 (3.5- 14.8 h) and 7.38 ± 1.75 h (4.08-11.11 h), respectively. No significant difference was found between the two breeds with regard to the length of the expulsion phase. No complications were noted during expulsion in all the parturitions.

As a result, regarding with acceptance of the male for mating and vaginal cytology, gestation length did not differ in German Shepherd and Labrador Retriever bitches. The number of fetuses did not affect duration of gestation. Rectal temperature decreased before the onset of whelping.

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