Researches on Litter Size in Kangal Breed of Turkish Shepherd Dogs

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Abstract: The study was carried out to examine litter size as a reproductive trait in the Kangal breed of Turkish shepherd dog in the central Anatolian province of Sivas between 2003 and 2005, under different environmental conditions. The study considered 145 L comprising 899 puppies, average litter size being 6.20 puppies. Average litter size in 2003, 2004 and 2005 was 5.94, 6.56 and 6.00, respectively but the difference was found to be statistically not significant ($p>0.05$). Grouping the age of dams as young (≤3 years), middle-aged (>3 years and <7 years) and old (≥7 years), average litter sizes were 5.83, 6.44 and 6.75, respectively; the difference was found to be not significant ($p>0.05$). Average temperature of birth month was classified as cold ($<5°C$), moderate (≥5 and $\leq15°C$) and warm ($>15°C$), average litter sizes being 6.02, 6.21 and 6.34, respectively; again, the difference was found to be insignificant ($p>0.05$). Average litter size by location of breeding was 6.45 for farms and 5.78 for villages and difference was found to be insignificant ($p>0.05$). As a result, it can be said that the environmental influences investigated had no effect on litter size in Kangal dogs.

Key words: Litter size, kangal dog, Turkish shepherd dogs, influences, insignificant

INTRODUCTION

The livestock protection breeds are among the most ancient of dogs. Indeed, the role of flock guardian may have been one of the first uses that humans have found for the domesticated dog. Livestock protection dogs probably originated in the Middle East and Asia (Sims and Dawydiak, 1990).

Of the Turkish Shepherd Dogs, the Kangal dog is the most famous worldwide. This dog is bred primarily in Sivas and neighbouring provinces, but also in different regions of Turkey and in several countries of the world. The Kangal dog is generally well known for its large, muscular body, the black mask on the face, extending to the nose, around the eyes, mouth and ears, the tail carried in a curl over back when alert and its trustworthy character (Ozcan, 2003).

Kangal dogs are dispersed all over the United States and are valued guardians of livestock as well as companions in the American home (Nelson, 1996). Kangal dogs working as livestock guardians in the US are reported to be able to cope with large predators such as mountain lion (cougar), grizzly bear, bobcat, wolf and coyote (Taylor, 1996).

The Kangal Dog is recognized by the United Kennel Club in the US and by the national kennel clubs of Australia, New Zealand and South Africa. Many Kangal Dogs are being bred in Germany as well, mostly by immigrant Turkish workers. Turkish Cynologique Federation, which is established on September 2006 is currently (2008) petitioning the Federation Cynologique Internationale (FCI) for recognition the Kangal Dog.

Reproduction in animals is affected by genotype and environmental influences. Environment includes habitat and all factors in the surroundings, such as air temperature, humidity, atmospheric pressure, light, precipitation, wind, altitude, care, nutrition, illness, shelter etc. Litter size is one of the animal's reproductive traits and also, varies according to ovulation rate (Akcapinar and Ozbeyaz, 1999). Average litter size in dogs is reported to be four puppies (Yavru, 1983). Generally, smaller dogs have smaller litters. Overall, the number of puppies in a litter ranges from 1-23 (Rice, 1996). Studies on litter size of Kangal dogs are very limited. In a study, on Turkish Shepherd dogs (Kangal, Akbash and other) in the west Anatolian province of Bursa (Kirmizi, 1991), the values obtained were an average litter size of 7.36 for 891 puppies from 121 L. In another study, on Turkish shepherd dogs in the same province, with 133 puppies from 19 births, average litter size was 7.00 (Gonul, 1996). In a different study in the central Turkish city of Konya, the average litter size in Kangal Dogs of various ages was 8.94 puppies from 18 L (Tepeli, 1996). Chappell (1996) analysed the UK Kennel Club's published Breed Records for Anatolian (Karabash = Kangal) Dogs over 2 years and found the average litter size for 35 L was 6, ranging from single to 15 puppies.

The aim of the current study, was to survey the litter size and some environment influences on litter size in Kangal Turkish shepherd dogs.

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MATERIALS AND METHODS

The research material consisted of 899 puppies obtained from 145 L produced by Kangal dogs owned by various institutions and breeders in Sivas, Kangal, Ulas, Sarkisla and surrounding villages. No additional special care was provided for the dogs, either at the institutions or in the villages. In general, the institution dogs had better kennels, while most of the village dogs had more basic shelters, those without specially, constructed homes using barns and sheepfolds or whatever, shelter they could find, especially during birth and suckling periods.

While, dogs kept at institutions or owned by serious breeders are fed more systematically, many breeders generally feed their dogs on yal, which consists mainly of barley flour.

Again, while institution dogs and those owned by serious breeders are vaccinated, in villages vaccination is not usually carried out. However, with the exception of some immunity stimulants, since all vaccination is carried out after weaning this has little effect on the study.

Births of puppies within the province of Sivas were registered through continuous visits and investigations. The age, birth date and size of litter for every dog were separately recorded on previously prepared forms.

Average temperatures in the region for every month were obtained using data from the meteorology station belonging to the Turkish State Meteorological Service (Akbulut and Ograk, 2005).

In the study, the Tukey HSD test was used to evaluate data variance (ANOVA) analysis of litter size according to some factors such as environmental temperature, age of dam, breeding location and date (Ozdamar, 2001). Using the SPSS program for statistical calculations, descriptive statistics and procedures for comparison of means.

RESULTS AND DISCUSSION

In this study, 899 puppies were obtained from 145 L. Average litter sizes, by year, age of dam, weather conditions and location, are given in Table 1.

Table 1 shows that in the years 2003-2005, average litter size was 5.94, 6.56 and 6.00 puppies, respectively, but differences were found to be statistically not significant ($p > 0.05$). Classifying the age of the dam as young (≤ 3 years), middle-aged (> 3 years and < 7 years) and old (≥ 7 years), average litter sizes were 5.83, 6.44 and 6.75, respectively, but differences were found to be statistically not significant ($p > 0.05$).

Classifying average air temperature of birth month as cold ($< 5°C$), moderate ($\geq 5°C$ and $\leq 15°C$) and warm ($> 15°C$), average litter sizes were 6.02, 6.21 and 6.34, respectively; again differences were insignificant ($p > 0.05$). Classifying by location of breeding, average litter size was 6.45 for farms and 5.78 for villages and differences were insignificant ($p > 0.05$). The proportion of male and female puppies was approximately equal, at 3.23 and 2.97, respectively overall.

The numbers of litters born and average litter size for each season of the year, for the 899 puppies, are given in Table 2. This shows that there were significant variations in the number of litters per season ($p < 0.001$), but variation in litter size by season was not significant ($p > 0.05$).

Table 3 shows distribution of litters born according to month. More litters were born in the spring months.

When, Fig. 1 and Table 4 is reviewed, it is seen that frequency distribution demonstrates to Normal distribution.

It was found that average litter size for all litters was 6.20 puppies, with a range of 1-12. This shows similarity with value reported by Chappell (1996) for Anatolian (Karabash) Dogs.

However, it was lower than values reported by Kirmizi (1991), Gonul (1996) and Tepeli (1996). These can

Table 1: Average male/female puppies per litter and average litter size according to age, weather, place and years

Variables	N	Litter size ($\bar{x} \pm s$)	F/t	Average male puppies/litter	Average female puppies/litter
Years					
2003	16	5.94±2.98	F	3.06	2.88
2004	54	6.56±2.52	0.864	3.44	3.11
2005	75	6.00±2.41		3.12	2.88
Age of dam					
Young	65	5.83±2.43	F	3.18	2.65
Mid. age	64	6.44±2.50	1.378	3.33	3.11
Old	16	6.75±2.82		3.06	3.69
Weather conditions					
Cold	50	6.02±2.17	F	3.04	2.98
Moderate	62	6.21±2.80	0.221	3.39	2.95
Warm	33	6.34±2.47		3.24	2.97
Place					
Farm	91	6.45±2.40	t	3.48	2.97
Village	54	5.78±2.67	1.567	2.81	2.96
Total	145	6.20±2.51		3.23	2.97

Table 2: Comparison of litter size and the number of litters born according to season of year

Seasons	Births N	(%)	X^2	Litter size $(\bar{x} \pm s\bar{x})$	F
Winter	22	15.2	56.19***	5.55±0.49	0.595[n.s]
Spring	75	51.7	-	6.32±0.29	-
Summer	28	19.3	-	6.25±0.51	-
Autumn	20	13.8	-	6.40±0.56	-
Total	145	100.0	-	6.20±0.21	-

***$p < 0.001$

Table 3: Distributions of the litters born according to month

Birth months	Jan.	Feb.	March	April	May	June	July
Frequency	10.0	7.0	20.0	27.0	28.0	9.0	11.0
Percent	6.9	4.8	13.8	18.6	19.3	6.2	7.6

Birth months	Aug.	Sep.	Oct.	Nov.	Dec.	General
Frequency	8.0	5.0	7.0	8.0	5.0	145.0
Percent	5.5	3.4	4.8	5.5	3.4	100.0

Table 4: Frequency and percentage values of dams according to litter size

Litter size	1	2	3	4	5	6	7
Frequency	3.0	11.0	8.0	12.0	16.0	32.0	25.0
Percentage	2.1	7.6	5.5	8.3	11.0	22.1	17.2

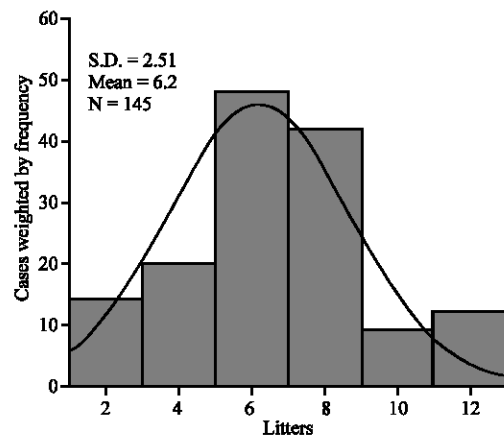| Litter size	8	9	10	11	12	Total
Frequency	17.0	6.0	3.0	9.0	3.0	145.0
Percentage	11.7	4.1	2.1	6.2	2.1	100.0

Fig. 1: Frequency distribution according to litter size

be attributed to the fact that Kirmizi and Gonul used all breeds of Turkish shepherd dogs their surveys and Tepeli used only 16 L his research.

CONCLUSION

As a result, average litter size can be regarded as breed characteristic in dogs and the value in the Kangal shepherd dog was found to be 6.20 puppies per litter. No impact on litter size could be attributing to the environmental influences that were investigated: air temperature, age of dam and location of breeding.

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