

PILOT STUDY REGARDING REPRODUCTION AND GROWTH IN SAINT BERNARD AND CAUCASIAN SHEPHERDS DOG BREEDS

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Abstract

This retrospective, observational, descriptive study includes two large dog breeds, the Caucasian Shepherd breed and the Saint Bernard breed belonging to a kennel in Romania, and was carried out for three consecutive years, to improve breeding practices and obtain canine specimens according to the international FCI recognized standards. The fertility, fecundity and prolificacy, stillbirth, survival at 28 days, the average daily gain and weekly growth rate were recorded and compared.

Key words: canine reproduction, Saint Bernard breed, Caucasian Shepherd breed

Introduction

The study addresses to two large dog breeds, Caucasian Shepherd and Saint Bernard.

The Saint Bernard is a molossoid mountain dog of considerable size, with a strong, muscular body and an impressive head with an expressive face. The dog has a calm, friendly temperament, being used as a pet and guard. This breed of Swiss origin has two varieties: long-haired and short-haired. The breed standard, being subject to constant changes over the years, the last version being published on 03.06.2016 (FCI-Standard N° 61, 2016).

The Caucasian Shepherd is a Russian, rustic, large-sized breed with a strong, harmonious body, with well-developed skeleton and musculature, almost rectangular in shape. Sexual dimorphism is well defined. Characteristic of males is the mane around the neck. The temperament of the Caucasian Shepherd is balanced, fearless, independent and devoted to the master, making the Caucasian Shepherd an excellent guard dog (Mars Pamela, 2010). (FCI-Standard N° 61, 2016 and FCI-Standard N° 328, 2011).

This work aims to evaluate some reproductive indices in the two breeds, such as fertility, fecundity, prolificacy, stillbirth rate and survival of puppies up to the 28th day of life, as well as calculating the average daily weight gain and the growth curve. The study also recorded the incidence of dystocia, the cause of dystocia, as well as the need for specialized assistance during parturition.

The motivation of the study is represented by the lack of data published in the specialized literature regarding the two breeds, Saint Bernard and Caucasian Shepherd, as well as the small number of studies in the specialized literature regarding large dog breeds.

For dog owners, breeders and for Cynological Associations, it is important to diversify the database regarding the reproduction and breeding of pet and guard dogs, to provide, at national and international level, some information necessary for the standardization and permanent revision of existing standards, which bring the possibility of breed improvement, to the advantage of the animal, but also for the breeder.

MATERIAL AND METHOD

The conducted study was observational, descriptive, retrospective and was carried out for 3 years in an attested FCI kennel in Uriu village, Bistrița Năsăud county, on a number of 23 dogs, representing all the adult specimens kept in the kennel, respectively 7 females and 6 males from Saint Bernard breed and 6 females and 4 males Caucasian Shepherd. Breeding of females in the kennel was done by artificial insemination. The evaluation of puppies development, including weighing, was carried out daily, in the first week of life, as well as in the 2, 3, 4 weeks of life. The average weight gain was calculated as average \pm standard deviation, based on the weights recorded at the times established in the research. The fertility, fecundity, prolificacy, newborn mortality and survival to 4 weeks were assessed. Based on

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the results of weighing the puppies, the evolution of weight and the average daily gain rate in the first four weeks of life (28 days), were calculated.

RESULTS AND DISCUSSION

The results of the study are presented in Table 1. During the study, the analysis focused on reproductive indices, thus only the bitches were taken into the calculation of these indicators. The batch of females was similar in number of specimens, Saint Bernard 7 females, respectively, Caucasian Shepherd 6 females (Table 1). The number of litters registered during the studied period was double in the Saint Bernard breed compared to the Caucasian shepherd breed, and the resulting gestations had the same distribution by breed, in favor of the Saint Bernard.

The average length of gestation in each of the two breeds was almost similar, all gestations being completed with parturition (there were no abortions during this 3 years period).

It should be noted that, although in the Saint Bernard breed the number of gestations was almost double, the number of puppies was almost half of the total number of puppies. (Table 1).

The number of live puppies resulting from gestations was almost equal in both breeds, and the number of dead puppies represented almost two-thirds of the total number of dead puppies, for the Saint Bernard breed. In the Caucasian Shepherd breed, the number of stillborn puppies was lower, representing less than a quarter of the total number of puppies born for this breed. (Tab.1.)

In the Saint Bernard breed, 40 male puppies (live and dead) were born, of which 15 were stillborn and 44 females (live and dead) of which 15 were stillborn. At Caucasian Shepherd, 31 males were born, of which 7 were stillborn, respectively 38 females, of which 10 were stillborn.

Analyzing the number of puppies according to gender, a female majority is recorded in both breeds. The total number of female puppies born was higher, both in the Saint Bernard breed and in the Caucasian Shepherd breed. No major differences were observed between the genders. Out of a total of 71 males (St. Bernard and Caucasian) born, 22 died, resulting in a stillbirth rate of 30.99%. In females (St. Bernard and Caucasian) out of a total of 82 newborns, 25 were dead, the stillbirth rate being slightly lower 30.49% compared to males.

The stillbirth compared to the sexes and the breeds was higher in the Saint Bernard breed, both in males and females, compared to the Caucasian Shepherd. In Saint Bernard, the stillbirth rate was higher in males compared to females (males 37.50% and females 34.09%), and in terms of stillbirth in Caucasian Shepherds, the rate was higher in females compared to males (females 26.32% and males 22.58%).

The stillbirth was higher in the St Bernard breed and the fertility, fecundity and prolificacy were higher in the Caucasian Shepherd breed. It should be mentioned that fertility in the Caucasian Shepherd breed had almost double values compared to the St Bernard breed.

During the studied period, most parturitions were natural, in both breeds, but there were also situations where the cesarean section was required. More than two-thirds of caesarean sections were performed in the St Bernard breed (Table 1). The reasons for these interventions were diverse, but mostly were due to uterine atony (Figure 1).

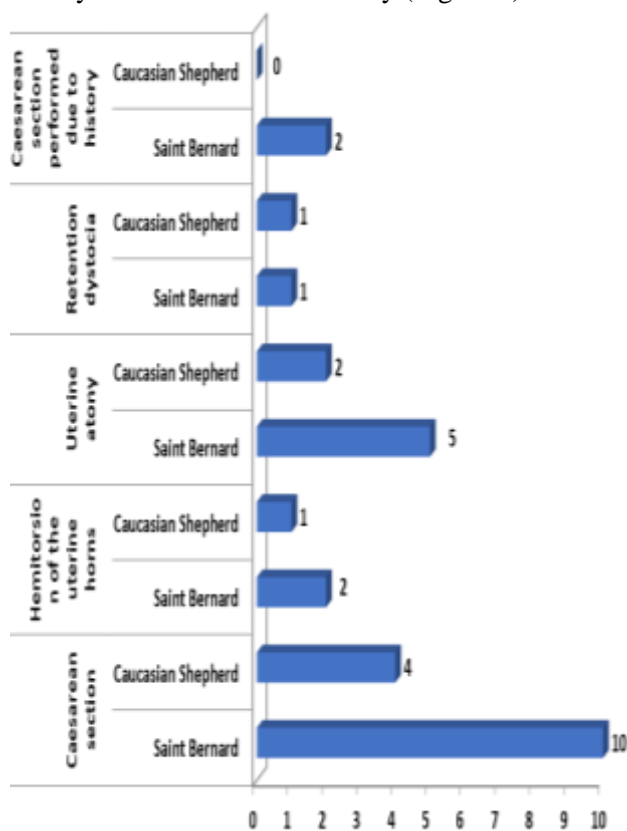


Figure 1 Reasons for the caesarean sections

Table 1

Summary table of studied parameters

Total kennel	Saint Bernard	Caucasian Shepherd	Average duration of gestation	Saint Bernard	Caucasian Shepherd	Total females in the kennel	Saint Bernard	Caucasian Shepherd
23	13	10	61,57	61,81	61,33	Fertility	75,75	72,72
100%	56,52	43,48	Total parturitions	Saint Bernard	Caucasian Shepherd	Fecundity	463,63	381,80
Total	Saint Bernard			25	16	9	Prolificacy	6,12%
13	6	7	100%	64,00	36,00	Total caesarians	Saint Bernard	Caucasian Shepherd
100%	46,15	53,85	Total number of puppies	Saint Bernard	Caucasian Shepherd	14	10	4
Total	Caucasian Shepherd			153	84	69	100%	71,43
10	4	6	100%	54,90	45,10	Stillbirths	Saint Bernard	Caucasian Shepherd
100%	40,00	60,00	Total number of live puppies	Saint Bernard	Caucasian Shepherd		30,72%	35,71%
Total females	Saint Bernard	Caucasian Shepherd	106	54	52	Survival rate at 4 weeks	Saint Bernard	Caucasian Shepherd
13	7	6	100%	50,94	49,06	87,74%	81,48%	94,23%
100%	53,85	46,15	Total number of dead puppies	Saint Bernard	Caucasian Shepherd	Total live puppies	Saint Bernard	Caucasian Shepherd
Total matings	Saint Bernard	Caucasian Shepherd		47	30	17	106	54
33	22	11	100%	63,83	36,17	100%	50,94	49,06
100%	66,67	33,33	Total number of St Bernard puppies	Live puppies	Dead puppies	Dead puppies at 4 weeks	Saint Bernard	Caucasian Shepherd
Total pregnancies	Saint Bernard	Caucasian Shepherd		84	54	30	13	10
25	16	9	100%	64,29	35,71	100%	76,92	23,08
100%	64,00	36,00	Total number of Caucasian puppies	Live puppies	Dead puppies			
				69	52	17		
			100%	75,36	24,64			

The survival of the puppies at 4 weeks was over 85% for both breeds, Caucasian Shepherd registered a survival rate of almost 95% (higher than those for the St Bernard breed). More than three quarters of dead puppies up to 4 weeks belonged to the St Bernard breed.

The share of caesareans sections for the total number of gestations was 56%, in St Bernard breed the caesarean sections had a share of 62.5% of the total gestations registered in this breed, and in Caucasian Shepherd it represented 44.44% of the total gestations per breed.

Mortality at 4 weeks was 15.47%, most of the puppies that died at 4 weeks belonged to the St Bernard breed (Table 1).

Analyzing the survival rate of puppies at 4 weeks, its value is higher in Caucasian Shepherd, (almost 95%), while for the St Bernard breed this indicator had lower values (respectively, slightly over 80%) (Table1).

After weighing the puppies, calculating the average weight ± standard deviation, the values presented in Figure 2 and 3 were obtained.

It should be noted that, from birth, the males of the St Bernard breed had a lower average weight than those of the Caucasian Shepherd breed, until the 3rd week of life, their average weight constantly recorded lower values than those of the Caucasian Shepherd breed, but, in the 4th week

they had a more pronounced increase in weight, so that by the end of the surveillance period, they exceeded the average weight values recorded in males from the Caucasian Shepherd breed. (Figure 2)

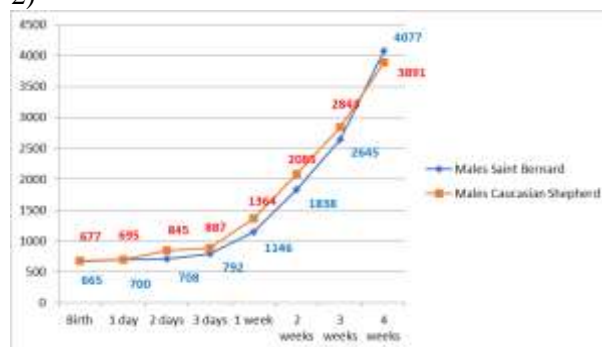


Figure 2 Body weight evolution of male puppies in the first months of life (grams)

The evolution was also similar in the case of the female puppies of the St Bernard breed: although throughout the studied period, the average weight of the female puppies of the Caucasian Shepherd breed had higher values than that found in the St Bernard females, the fourth week recorded more important values, so that at the end of the period, the average weight of St Bernard females exceeded the average weight of those from the Caucasian Shepherd breed (Figure 3).

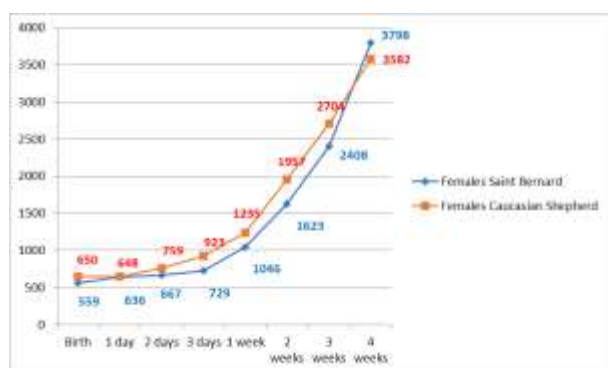


Figure 3 **Body weight evolution of female puppies in the first months of life (grams)**

In the first three weeks of life, female St Bernard puppies recorded the lowest values in the average daily gain per week, but in the fourth week they had higher values than Caucasian Shepherd females and males. Although males and females from the Caucasian Shepherd breed had higher average daily growth rates per week, even from parturition, at the end of the fourth week, they had the lowest values (Figure 4).

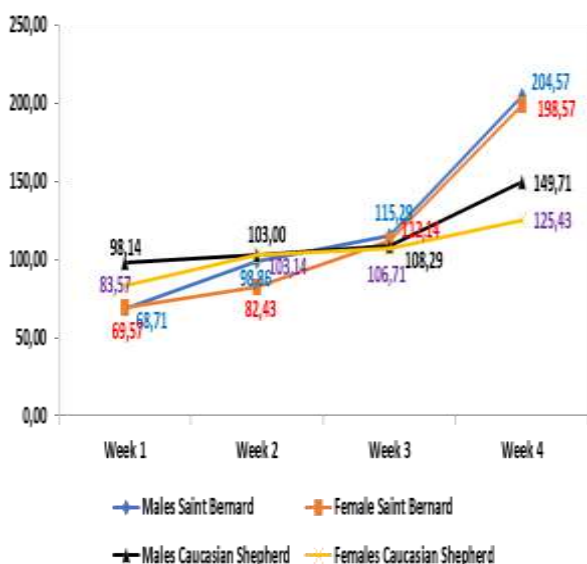


Figure 4 **Daily weight gain in each week of the puppies in the kennel (grams)**

In our study, the average duration of gestation, for both breeds, was 61.57 days, roughly equal to St Bernard (61.81) and Caucasian Shepherd (61.33) and is similar to the data from the specialty literature (Linde Forsberg C. *et al*, 2007)

A retrospective study carried out by Bobic Gavrilovic on Drever dog breed, out of 285 mounted females resulted in 224 gestations, with a fertility rate of 78.6%, and the incidence of dystocia being 6.25%, the need for caesarean section being 5.36%. During the study, the stillbirth rate was 7.6%. In terms of female age, fertility decreased in 5-year-old bitches, bitches between 4-5 years of age had a fertility of 5.18%,

and over 7 years of age fertility decreased to 4.24%. Drever dogs are a breed of Swedish origin, with short legs, used for deer hunting (Gavrilovic B. *et al*, 2008).

In our study, the average fertility in the kennel was 75.75%, the lowest value being recorded in the St Bernard breed (72.72%), with lower values than those found in literature, but compared to the Caucasian Shepherd breed (81.81%), a higher fertility rate was recorded than that reported in the studies found in the literature. We have to observe that there are no specific studies according to breeds from this point of view for the two studied breeds in the current specialized literature.

In a retrospective study carried out in Kenya, over a period of 15 years, 594 females of the German Shepherd breed were analyzed, and from 798 matings, 594 pregnancies and 3592 pups resulted. The information was verified through the East African Kennel Club registries. 73.7% of the females were mounted, fertility being 95.5%, prolificacy 6.4, stillbirth 2.3% and mortality 11.4%. The average length of gestation was 60.6 ± 5.1 days (Mutenbei H.M. *et al*, 2000).

In our study, mortality in the first 4 weeks of life was 15.47%, in the first week of life the highest number of dead puppies was recorded (11 out of 13 deaths for the entire studied period).

The size of the litters in the canine species varies, from a single litter, especially in miniature breeds, to 22 litters in large breeds. The number of offspring is lower in 1-2-year-old females, at 3-4 years the number of offspring increases, and from the age of 5-6 the prolificacy decreases. Gestations with only one or two pups are prone to dystocia and subsequent stillbirth (fetal death) due to insufficient stimulation of the uterus and usually the increased size of the fetus, "single pup syndrome". This can occur in dogs of any size (Linde Forsberg C. *et al*, 2007).

The mortality rate in newborns is influenced by the following maternal factors: breed (large breeds have a higher degree of risk), nutrition (the diet of the female influences the physical condition and quality of the colostrum), lactation (if the female experiences difficulties with lactation or feeding the pups, they face a higher degree of mortality) (Mila H. *et al*, 2014). A study carried out in France, shows a mortality rate after birth of 22.8% of a total of 2288 puppies born, 70% of them died in the first week, and the stillbirth was 10% (Belin M. *et al.*, 2013).

Stillbirth, according to some studies, varies in the canine species between 10-35%, the average being 12%. More than 65% of the cubs died at birth and in the first week of life. The main cause

of mortality was attributed to fetal asphyxia (42.5%), most pups, 82.2% dying during birth or within the first 24 hours (Linde Forsberg C. *et al.*, 2007).

In Australia, from a total of 500 litters, 2574 puppies were born from 44 different dog breeds, with an overall stillbirth of 20.2%. (Gill M.A. 2001).

In our study, the stillbirth rate for the kennel was 30.72%, higher proportions being recorded in the St Bernard breed (35.71%), compared to the Caucasian Shepherd (24.64%).

Another study included 100 pregnant females of different breeds, resulting in 514 puppies (280 males and 234 females). Mortality in the first 21 days was 20.6%, of which 34.9% of the puppies died in the first 2 days post partum. The average weight of the puppies at birth was 514g, on day 2 the weight was 477g. Birth weight was influenced by litter size, with an increased number of pups at birth negatively influencing their weight. Mortality was associated with low body mass, with 81.1% of dead puppies having low body weight (Mila, *et al.*, 2015). The main causes of dystocia in bitches are maternal in 75.3% (complete primary atony 38.9%, partial primary atony 23.1% and uterine torsion 1.1%), and fetal, in proportion of 24.7% (malposition 15.4%, malformations 1.6 % and fetal death 1.1%) (Walett D. and Linde-Forsberg C., 1994).

In our study, the main cause was primary atony, which determined the highest number of caesarean sections in the St Bernard breed. A study carried out in Great Britain shows an incidence of caesarean sections in the Saint Bernard breed of 41.2% (Jerold S. Bell *et al.*, 2012). In our study, the share of caesareans in the total number of births was 56%, with St Bernard being higher (62.5%) compared to Caucasian Shepherd (44.44%).

CONCLUSION

The research represents a pilot study for the Saint Bernard and Caucasian Shepherd breeds, the type of research carried out does not allow the extrapolation of the results to the entire canine population of the two breeds.

During the studied period, 25 pregnancies were registered, resulting in 153 puppies (106 live births and 47 stillbirths.)

The prolificacy in Caucasian Shepherd breed was 7.66%, fecundity was 627.27% and fertility was 81.82%.

In St. Bernard breed, the prolificacy was 5.25%, fecundity 381.80% and fertility 72.72%.

Among the 14 diagnosed dystocia, uterine atony ranked first (7 cases). It is recommended to prevent uterine atony by ensuring a balanced diet

and freedom of movement of females during pregnancy. Also, further surveillance is needed, a predisposition of the breed for uterine atony might be identified, but this was not the subject of our study.

Specialized assistance and monitoring throughout gestation and at parturition is recommended to reduce stillbirths and the increased number of cesarean sections in large breeds.

Survival at 4 weeks was higher in Caucasian Shepards, 94.23%, compared to 81.48% in St. Bernard. The number of dead pups at 4 weeks, compared by sex, was higher in females compared to males (5 males and 5 females in St. Bernard, respectively 0 males and 3 females in Caucasian Shepherd). It is recommended to carefully monitor the puppies, especially in the first week of life and ensure the optimal temperature and, if necessary, supplement the food with milk replacer.

In our study, the main cause that determined the pregnancy to end by caesarean section was uterine atony, which determined the highest number of caesarean interventions in the St Bernard breed, the share of caesareans in the total pregnancies was 56%, with St Bernard being higher (62.5%) compared to the Caucasian Shepherd (44.44%). In these large dog breeds, the study confirmed the high need for veterinary assistance at parturition. Because both breeds belong to the same kennel and they are kept under the same conditions (food, space, climate, care, etc), we can assume that the differences that we identified can be attributed to breed and genetic factors and not the environmental ones.

Although the males and females of the Caucasian Shepherd breed had higher values of the average daily gain rate per week, since parturition, at the end of the fourth week, they had the lowest values in the kennel.

Weight gain was generally higher in males than in females, for both breeds studied.

During the study, more females were born (44 St. Bernards and 38 Caucasian Shepherds), a fact that helps the selection and improvement of the breeds, through the easier possibility of refreshing the selected lines.

The different results obtained by other authors compared to our own may be due to different climatic and living conditions, different breeds differently adapted to local conditions, as well as the popularity of dog breeds in a certain place and year.

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