Article
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VETERINARY CARE NEEDS IN KENNELS OF BRACHYCEPHALIC AND NON-BRACHYCEPHALIC DOGS - PILOT STUDY

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Abstract

This is a descriptive, observational pilot study, based on the results obtained by applying an original questionnaire addressed to purebred dog breeders, speakers of the French and Romanian languages, regarding the perceived need for medical-veterinary assistance in canine reproduction. 44 answers were obtained (24 in French, 20 in Romanian) about 167 (100%) bitches from 33 brachycephalic and non-brachycephalic dog breeds, aged between 2 and 7 years, of which 75 (44.91 %) declared pregnant. The need for estrus monitoring by a veterinarian varied by group and breed type (68.62% of non-brachycephalic females, 41.66% brachycephalic), "small non-brachycephalic" breeds were monitored more intensively (90.90 %), artificial insemination was necessary in 49.33% of the gestation obtained (50.98% in non-brachycephalic breeds; 45.83% in brachycephalic breeds). All the breeders declared ultrasound confirmation of pregnancy, in brachycephalic breeds caesarean section was necessary in 45.8% of cases, post-partum veterinary control was requested only in 22.7% of cases, more frequently (37.5% of cases) to "large and medium brachycephalic" breeds (76.9% of answers). The puppies from the "giant brachycephalic" breeds were tested by a veterinarian, an aspect declared by 43.8% of the Romanian breeders and only 38.1% of the French respondents. Conclusion: Due to the type of research chosen, the results obtained in the present study cannot be extrapolated to the entire population of dog breeders, but it is a potential means of evaluating the needs felt and expressed by veterinary medical assistance in dog breeding.

Key words: brachycephaly dog breeds, nonbrachycephalic dog breeds, canine breeders

Introduction

Dogs from canine breeds (over 300 breeds) were, and remain, among the most frequent patients of the veterinarian. Purebred dog breeders turn to this professional for advice and preventive, curative and recuperative interventions, both for physiological conditions (gestation) and for various pathologies.

The different breeds of dogs do not require the presence of the veterinarian in all the stages of the life cycle and the individual variability contributes a lot to the diversity of the needs for specialized medical-veterinary intervention. In reproduction, due to the genetic predispositions of certain breeds of dogs towards specific health and/or reproductive problems, the veterinary specialist is requested more frequently for certain breeds of dogs.

A dog is considered brachycephalic based on the morphology of its skull:

"Brachycephalians have a short and broad head, with a rounded skull, without an external sagittal crest but with an absent or very weak nuchal crest. This particularity allows them to be differentiated from two other groups of dogs: mesocephalic and dolichocephalic (Homo N., 2008)

The proportions of the skull are defined by two indices:

- "Cephalic index (CI), which is defined as the ratio of head width to head length: (head width / head length) x 100. It varies from 50 in extreme dolichocephaly (Greyhound), 70 in mesocephalic and 90 in extreme brachycephalic (Pug).
- the craniofacial index, defined as the ratio between the distance from the external occipital protuberance to the frontonasal suture, and that from the frontonasal suture to the rostral end of the nasal bone. It ranges from 10/7 dolichocephalic to 10/3 brachycephalic.

These two morphological clues reveal the compact appearance of the head of dogs from brachycephalic breeds. It fits in the dimensions of two squares" (Lignereux Y. *et al*, 1991; Homo N., 2008)

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The current research allowed the comparative evaluation of some parameters regarding the reproduction of purebred dogs; with an impact on reproduction management (gestation duration depending on the size of the breed), or those that have a direct economic impact (number of pups born and weaned, frequency of dystocia and cesarean operations, etc.) as well as the stages of the veterinarian's intervention, their frequency, depending on the different brachycephalic dog breeds, prone to dystocia, and non-brachycephalic breeds.

MATERIAL AND METHODS

This is an observational, descriptive study and it was developed based on an original working questionnaire with 17 items, addressed to dog breeders, speakers of French, Romanian, English, made through an online form through the Internet.

The purpose of the research was to evaluate the attitude of dog breeders regarding the perceived need for specialized veterinary intervention in the management of the reproduction of puppies of different breeds.

The objectives of the study consist in knowing the stages of the veterinarian's intervention depending on the size and type of dog breed (small, medium, large or giant breeds and brachycephalic or non-brachycephalic).

The administration of the questionnaire was done online, the data collection was by self-registration.

The selection of participants was made by contacting different discussion/sharing groups through social networks, direct contact of breeders through their website, but also of breeders known from their own veterinary activity, who were ask them to send the questionnaire to other known breeders, collecting the data. The respondents accepted participation in the research and gave their consent to be included in the study by completing and returning the questionnaire.

To facilitate the interpretation of the results, the dog breeds were classified into several groups according to their adult weight and their phenotype, brachycephalic or non-brachycephalic.

Inclusion criteria for brachycephalic breeds:

- giant breeds: breeds for which adults weigh more than 45 kg;
- large breeds: breeds for which adults weigh between 25 and 45 kg
- medium breeds: breeds where adults weigh between 10 and 25 kg
- small breeds: breeds where adults weigh less than 10 kg

Inclusion criteria for non-brachycephalic breeds:

- giant breeds: breeds for which adults weigh more than 45 kg
- large breeds: breeds for which adults weigh between 25 and 45 kg -
- medium breeds: breeds for which adults weigh between 10 and 25 kg.
- small breeds: breeds where adults weigh less than 10 kg

Some breeds present in this study that can be classified into two different groups, based on individual factors, were classified in their upper weight limit (French Bulldogs - in the class of medium brachycephalic dogs, Boxers in the class of large brachycephalic dogs, etc.).

RESULTS AND DISCUSSION

Out of the more than a hundred purebred dog breeders contacted, 44 responded to the questionnaire (24 French/Swiss, 20 Romanian), accepted participation in the research and gave their consent to be included in the study, by completing and returning it.

Following the application of the questionnaire, in the study, data were obtained on 167 (100%) bitches from 33 dog breeds belonging to kennels whose owners' accepted participation in the research and completed the questionnaires. (Figure 1)

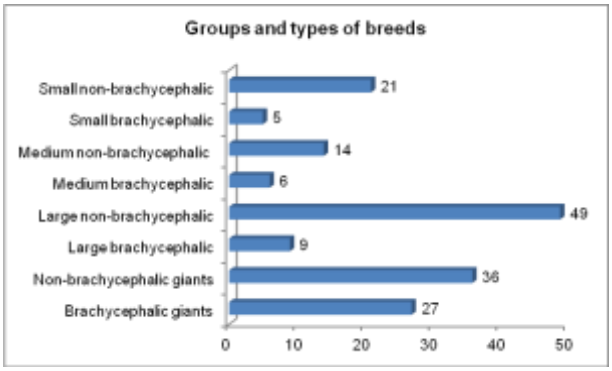

Figure 1 **Distribution of the group and type of breeds in the total panel enrolled**

From all the females studied, 75 (44.91%) were declared pregnant at the time of data collection. It should be noted that the owners of kennels for "large brachycephalic and non-brachycephalic" breeds who completed the questionnaire had a weight of 72.45% of the total panel and 69.33% of the total declared pregnant bitches.

By grouping dogs according to phenotype and without considering their group, we found that data were collected on 47 (100%) brachycephalic bitches, of which 24 (51.06%) were pregnant and 120 (100%) of bitches belonging to non-brachycephalic breeds, of which 51 (42.50%) bitches were pregnant. Without considering the

weight of the bitches, we can see that the number of non-brachycephalic females (120) in the studied group is more than twice as high as the number of brachycephalic females (47) declared by the respondents.

In our study, the age of the bitches declared pregnant at the time of the research shows that 50.66% of the bitches in the panel are between 2 and 3 years old, 33.33% are between 4 and 5 years old, 14.66% are between 6 and 7 years old and that no bitch is over 8 years old.

In dogs, puberty occurs on average between 4 and 18 months, according to Fontbonne *et al* reproduction of bitches from the first heat is not indicated, because at this stage the development of the pelvis is not yet finished and the maternal instinct/behavior of the bitches at this age is not adequate. Mating is recommended in at least the second heat in small dogs (usually around two years) and the third heat in large dogs. After 6-7 years, bitches show a progressive degeneration of the ovules. The bitch may be pregnant but the risks of malformed and small pups with calving difficulties (by non-release or obstructive dystocia due to too large a puppy) increase. It also increases the risk of disease (eclampsia) and reduced breastfeeding capacity. (www.centrale-canine.fr)

Analyzing the answers of the breeders participating in our study regarding an important stage in the reproduction cycle, that of monitoring heat in bitches, most of the respondents declare that they called on the expertise of the veterinarian, thus, for each breed and regardless of the size of the dogs or the category of brachycephaly or non brachycephalic, the number of specialized veterinary interventions exceeded that of the supervision carried out by the breeder. (Figure 2)

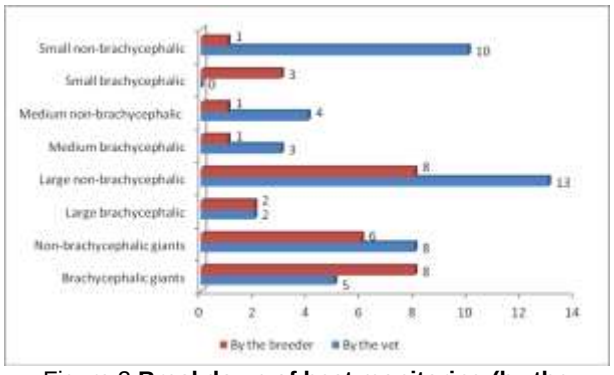

Figure 2 **Breakdown of heat monitoring (by the veterinarian or breeder) according to the group and type of breed**

It should be noted that the answers given by the participants in our study support that the "small non-brachycephalic" breeds were monitored more intensively than the other groups: in fact, 90.90% of the dogs in the research group were thermally monitored by the veterinarian and in all specimens they were given the progesterone test, alone or accompanied by a vaginal smear. In contrast, the so-called "small and brachycephalic" breeds were not watched at all by a veterinarian during heat; it was the breeder who monitored the heats of the females, either by smearing or observing the vulva or behavioral changes.

Monitoring of heat by a veterinarian therefore varies by group and breed type. Of the total number of pregnant females, 60% had, prior to pregnancy, thermal monitoring, vaginal smear, hormonal dosing or follicular stimulation, performed by a veterinarian.

The frequent call to a veterinarian at this stage is explained by the fact that the breeder is thus more certain to correctly detect the most favorable moment to have the maximum fertility rate of the bitches, which increases the chances of pregnancy.

Depending on the type of breed, heat monitoring is variable. We note that 68.62% of the non-brachycephalic females had heat monitoring performed by the veterinarian, compared to only 41.66% of the brachycephalic females.

Analyzing the type of litters made for the 75 pregnant bitches, it can be noted the presence of natural litters (38=50.66%) in weight close to artificial insemination (37 litters=49.33%). (Figure 3)

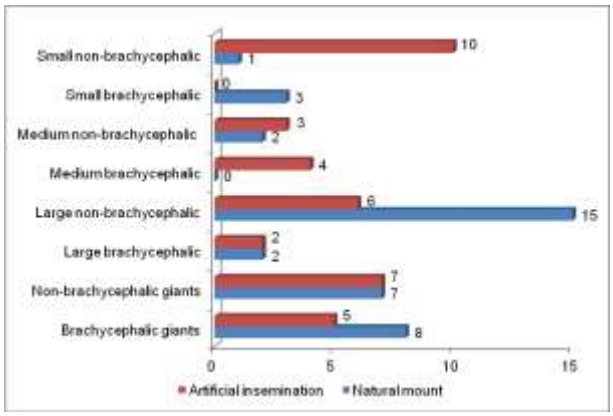

Figure 4 **Distribution of the type of insemination (natural/artificial) according to the group and type of breeds**

Regardless of weight, in total, in the brachycephalic category, 13 natural mounts (54.16% of the total mounts made in this category) and 11 artificial mounts (45.83%) were reported. In the non-brachycephalic breeds, out of the 51 (100%) foals reported, those achieved naturally represented 25 cases (49.01%) and those through artificial insemination were 26 (50.98%). In our study, the "large and non-brachycephalic" breeds had a share of natural reproduction of 71.42%, in contrast to the "small and non-brachycephalic"

breeds in which artificial insemination was used in 90.90% of cases.

It should be noted that in both analyzed categories (brachycephalic and non-brachycephalic) litters made by artificial insemination represented approximately half of the total litters, an important aspect that demonstrates the need for specialized veterinary assistance for their realization.

Our panel being composed of a majority of so-called giant brachycephalic dog breeds, this explains the results obtained as this category does not necessarily need mating assistance, unlike certain "medium and brachycephalic" breeds such as the Bulldog French from our study, where we found that artificial insemination was chosen by all respondents who are breeders of such dogs. (Figure 3)

The choice of the type of mount depends on the breeder, for efficiency or practicality, as well as on the breed of the dog. Indeed, some dog breeds such as English Bulldog, French Bulldog, Pug, require the intervention of a professional for mating (artificial insemination). In our study, the intervention of the veterinarian at this stage was necessary in 49.33% of the herds.

Natural mating remains the most frequently used method of reproduction (Badinand F. *et al*, 1998), (Greco D.S., 2008). This can be explained by the fact that artificial insemination represents an additional cost compared to that of a natural mating and requires the intervention, and therefore the cost, of the veterinarian.

The veterinarian intervened in this stage of canine reproduction by artificially inseminating 50.98% of females from non-brachycephalic breeds and 45.83% of females from brachycephalic breeds.

The ultrasound examination is a safe, precise, fast, early (starting from 25 days after fertilization) and risk-free means, and the least expensive compared to other verification methods (by measuring relaxin or radiography) and is the most used to establish the pregnancy diagnosis. Breeders prefer to call the veterinarian at this stage to be sure of the pregnancy.

In the current study, all the breeders (100%) declared that the confirmation of the state of pregnancy and the establishment of the diagnosis of pregnancy was made by the veterinarian, based on the ultrasound scans and the specialized consultation.

The veterinarian does not necessarily intervene during eutocical parturition. On the other hand, they are required during dystocia. In the literature, the need for caesarean section intervention appears:

- when the female has exceeded the gestation period: the first signs listed above appear and no signs of labor occur for more than 24 hours, or if no birth occurs within 36 hours after the progesterone falls below 2 ng/ml;
- when the female exhibits strong expulsive efforts for more than 20-30 minutes without any fetus emerging;
- when there is green vulval discharge but no fetus is expelled. More generally, when the female has vaginal discharge for more than 2-3 hours without signs of labour;
- when the time between each litter is more than 4 hours. The average expulsion time between each litter should be 20 to 30 minutes;
- when there are stillborn foetuses;
- when the total time of expulsion for all litters is more than 4-8 hours, with possible lengthening in primiparous or high litter bitches;
- when these parameters are not met, veterinary intervention is required.

According to Fontbonne A. *et al*, dystocia is "the inability to expel fetuses without assistance. Dystocia exists when a female has a full-term pregnancy and no signs of parturition appear or when she has started labor but is clearly unable to expel her fetuses alone.

This dystocia are due to uterine contractions that are too weak, unproductive or too prolonged, without fetal expulsion, or to obstructions (disproportion between the size of the fetus(es) and the mother's pelvic symphysis, insufficient dilation of the soft tissues, torsion/rupture of the uterus...).

According to Gravilovic B.B. *et al*, the incidence of dystocia in dogs is on average 5%, but is influenced by the breed and age of the pregnant bitch: an increase in dystocia is observed in bitches over 7 years of age.

According to Bergström A. *et al*, the breeds most at risk are miniature and so-called giant breeds. The incidence can reach up to 100% in certain breeds, especially in brachycephalic dogs (Linde-Forsberg C. *et al*, 1998).

According to Evans K.M. *et al*, 10 breeds are distinguished by a higher number of dystocia: Boston Terrier, Bulldog, French Bulldog, Mastiff, Scottish Terrier, Miniature Bullterrier, German Wirehaired Pointer, Clumber Spaniel, Pekingese, Dandie Dinmont Terrier.

Your vet can intervene in different ways: by injecting substances that dilate the soft tissues, substances that increase contractions (oxytocin), obstetric maneuvers or surgery such as caesarean section when the obstruction is upstream of the vagina or if medical treatment does not work. It is the most commonly used surgery for dystocia. In our group of bitches, veterinary intervention for

parturition, by performing cesarean section, had a low frequency in every brachy or non-brachycephalic group, except for the so-called "medium brachycephalic" breeds, for which the frequency of veterinary intervention in specialized assistance for parturition (cesarean section) was 100% (Figure 4).

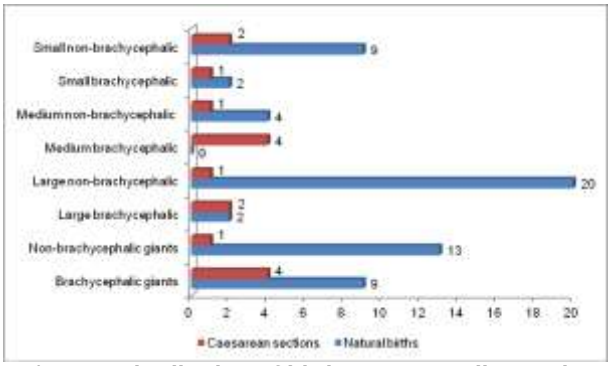

Figure 4 **Distribution of birth type according to the group and type of breed**

For the so-called "large and brachycephalic" breeds, there were 50% natural births and therefore 50% caesarean sections. The group for which the veterinarian intervenes the least is the so-called "Large and Brachycephalic" breeds where 95.20% of births were natural; closely followed by the so-called "Giant Brachycephalic" and "Small Brachycephalic" breeds with 92.90% and 90.2% of natural births respectively.

For non-brachycephalic dog breeds we can see that with a proportion of 90.19% natural births, the veterinarian intervened little at this stage. In this group, only 9.80% of fetuses were completed by caesarean section. As for the brachycephalic breeds, the veterinarian intervened 45.8% in our group of females, which shows a more frequent veterinary intervention at this stage of reproduction in brachycephalic breeds than in non-brachycephalic breeds.

Long-term selection of the phenotype of dogs led to the observation of changes in pelvic geometry. In brachycephalic patients, for example, there is a dorso-ventral flattening of the pelvic canal, which predisposes them to mechanical dystocia. Larger size and skull morphology also favor obstructive dystocia. Finally, bitches of these breeds often have weak abdominal musculature and breathing difficulties that can make expulsion of the fetus difficult and thus may require caesarean section.

Postoperative complications, especially post-caesarean section, are possible. There are risks of endometritis, retained placenta, hemorrhage, uterine prolapse, mastitis, wound infection, peritonitis and postpartum hypocalcaemia. The veterinarian will therefore take all necessary measures to avoid as far as possible all these complications and postoperative follow-up of the bitch is strongly recommended.

The veterinarian can intervene with advice to breeders for advice on the diet of the pregnant and post-pregnancy dog; as well as the bitch, or with expert answers to any other questions the breeder may have.

At the post-partum check-up stage, in our study, the veterinarian was consulted in only more than a fifth of cases (22.70%) by the breeders participating in the research. We note that most requests were for "large brachycephalic" and "medium brachycephalic" breeds. The types of veterinary specialist intervention were for scar control/removal of sutures, feeding advice for the puppies and/or for the lactating bitch.

Overall, 15.70% of non-brachycephalic bitches, had postpartum follow-up, including scar checks, suture removal and/or diet advice. A large majority of breeders, 84.30%, stated that they supervised this stage without the help of a veterinarian.

For brachycephalic bitches, the rate of veterinary intervention at this stage was higher (37.50% of cases). These percentages can be explained by the fact that there were more caesarean operations (45.8%) and that the breeders declared that they preferred to request postpartum follow-up by a veterinarian.

At this stage, veterinary assistance is recommended especially to breeders of females who have completed gestation by caesarean section, in order to follow the good evolution of the plague / scar. This check-up is most often free of charge to encourage breeders to request a follow-up of their dog. In our study there were also situations recorded where some breeders of naturally faected bitches also consulted their veterinarian for advice on feeding their puppies or nursing bitches.

The batches for which puppies were tested the least were the breeds 'large brachycephalic', 'medium brachycephalic' and 'small brachycephalic'.

On the other hand, the breeds for which, affirmatively, puppies were frequently tested, and this in 76.9% of the responses, were the "giant and brachycephalic" breeds, in which tests for dysplasia (of hips and/or elbows), genetic, cardiac or deafness tests were performed. These were carried out according to the breeds and their predisposition to certain diseases

For the other groups, the proportions of puppies tested varied, but in general, the majority of puppies were not tested, according to the breeders participating in this study. It is worth

mentioning that in our study, in large and small brachycephalic puppies, as well as in medium non-brachycephalic puppies, no post-partum testing of puppies was reported.

Affirmatively, the veterinarian intervened at this stage on 50% of the brachycephalic bitch puppies in our group by performing hip/elbow radiographs to check for dysplasia; blood sampling for genetic testing for pathology; heart/kidney ultrasounds to detect possible malformations; tests to detect deafness and exclude puppies from breeding.

For non-brachycephalic breeds, the veterinarian intervened in only 35.3% of cases.

In France, there is a website (www.centrale-canine.fr) that provides for registration for: "Any mention of screening results for genetic defects, whether congenital (autosomal) [...], hereditary only or considered hereditary, but, it is desirable to also register data on hip (HD-) and elbow dysplasia, patellar luxation and retinal ectopia".

These examinations testify not only to a selection specific to the act of breeding, but also to a contribution of the breeder to the traceability of origins for the future, especially if the puppy sold would be used for reproduction, [...]."

These tests for genetic defects are therefore not compulsory and not all breeders do them and thus take the risk of having dogs with genetic defects.

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The analysis of the answers given by the French and Romanian speakers regarding the postpartum testing of puppies revealed that almost half of the Romanian breeders (43.80%) participating in the study declared that they had tested their puppies, the French breeders declaring this activity in only 38.1% of the cases.

CONCLUSIONS

The study assessed the opinion of a group of respondents from France and Romania, breeders of pedigree dogs, on the perceived need for veterinary intervention throughout the reproductive cycle of bitches, according to groups and types of dog breeds.

The study analysed data on 167 bitches, of which 75 were pregnant, belonging to 33 different breeds of dogs.

The results revealed the influence of breed group and breed type on the stages and frequency of veterinary intervention in the reproductive cycle of female dogs, in agreement with data from the literature.

The veterinary interventions, felt as needs for specialist assistance, expressed by the breeders participating in this study were: estrus supervision, choice of artificial insemination, choice of pregnancy diagnosis or caesarean section in medium-sized brachycephalic breeds, testing of puppies, postpartum monitoring of bitches.

Due to the type of research chosen, the results obtained in the present study cannot be extrapolated to the entire population of dog breeders but it is a potential means of assessing the felt and expressed needs of veterinary nurses who are passionate about dogs and involved in dog breeding.

This study is just a first look at the role that the veterinarian plays in the reproductive cycle of the female dog, depending on the breed type. In order to confirm the trend observed in this study, it would be necessary to extend the study to a larger number of breeders as well as to a national representative sample, which would allow the estimation of the real need for veterinary care for this important category of pets.

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