

CRITICAL EVALUATION OF THE ENVIRONMENT IN BELGIAN DOG BREEDING KENNELS DURING THE PUPPIES' SOCIALIZATION PERIOD

Kritische evaluatie van de omgeving in Belgische hondenfokkerijen gedurende de socialisatieperiode van de pups

R. De Meester^{1,3}, C. Moons², H. Van Bree³, F. Coopman³

¹Vethoconsult

Sint Anna 100, B- 9220 Hamme, Belgium

²Department of Animal Nutrition, Genetics, Breeding and Ethology,
Faculty of Veterinary Medicine, Ghent University,
Heidestraat 19, B-9820 Merelbeke, Belgium

³Department of Medical Imaging, Faculty of Veterinary Medicine,
Ghent University, Salisburylaan 133, B- 9820 Merelbeke, Belgium
rudydemeester@telenet.be

ABSTRACT

Different authors emphasize the role of an appropriate early environment during the juvenile period in the prevention of behavioral problems in puppies. In the present study, the authors investigate whether the conditions in which Belgian breeders raise and sell puppies meet the recommendations posed in the scientific literature. A questionnaire consisting of 20 questions was returned by 48 breeders. From the results it could be concluded that in all the breeding kennels both major and minor deviations from the conditions recommended in the literature were found. In a high percentage of the kennels that were examined, weaning occurs when the puppies are too young, the remaining puppies are kept solitary after the others have been sold, and not enough unfamiliar visual, olfactory and acoustic stimuli or toys are provided. A significant percentage of the puppies never leave the kennels and have no regular contact (or no contact at all) with unfamiliar humans or other non-canine animals. This leads to the conclusion that in a significant percentage of the breeding kennels the environment may not provide a solid basis for proper socialization. Consequently, efforts made by the new owners to achieve socialization are crucial. Depending on the number of breeding bitches in the kennel, the nature and degree of the deficiency will vary. In larger kennels the conditions seem to be less suitable than in smaller kennels (up to 19 breeding bitches). However, a larger scale study is needed to confirm the tendencies that were found in this preliminary investigation. If these tendencies are confirmed, then amendments should be made in the Belgian legislation concerning the recognition of dog breeding kennels.

SAMENVATTING

Verschillende auteurs benadrukken de rol van een geschikte omgeving tijdens de vroegste levensfasen in de preventie van gedragsproblemen bij honden. In deze studie werd nagegaan of de omstandigheden waarin Belgische fokkers hun pups opvoeden en verkopen, in overeenstemming zijn met de aanbevelingen die daarover in de wetenschappelijke literatuur terug te vinden zijn. Een vragenlijst met 20 vragen werd door 48 fokkers beantwoord. Uit de resultaten blijkt duidelijk dat er in alle onderzochte kennels belangrijke en minder belangrijke afwijkingen bestaan van wat in de literatuur wordt aanbevolen. In een groot aantal van de onderzochte kennels wordt op een te jonge leeftijd gespeend, worden de laatste pups geïsoleerd gehouden na verkoop van de andere, en worden onvoldoende nieuwe visuele, auditieve of olfactorische prikkels of speeltjes verschaft. Een grote groep pups verlaat nooit de kennels en heeft geen of onvoldoende contact met andere diersoorten of vreemde mensen. Hieruit blijkt dat de omgeving in een belangrijk deel van de kennels niet geschikt is om een solide basis te zijn voor een goede socialisatie. De inspanningen die door de latere eigenaars geleverd dienen te worden om een goed gesocialiseerde pup te krijgen, zullen derhalve van het grootste belang zijn. Naargelang de grootte van de kennel verschillen de

aard en de graad van het tekort. In grotere kennels zijn de omstandigheden over het algemeen duidelijk minder gunstig dan in de kleinere kennels (tot 19 moederdieren). Een studie op grotere schaal is echter noodzakelijk om deze preliminaire resultaten te bevestigen. Mocht een bevestiging het geval zijn dan zou dit moeten leiden tot een aanpassing van de wetgeving met betrekking tot de erkenning van hondenfokkerijen.

INTRODUCTION

Behavior is determined by the interaction between the expression of the genome and the environment to which an individual is exposed throughout its life (Fuller and Clark 1968; Hay and Singleton 1980; Schoenecker and Heller 2000; Brenoe *et al.* 2002; Jacobs *et al.* 2004). The prenatal and neonatal environments, in particular, exert a great influence on the way animals will behave as adults (Liu *et al.* 1997; Wilsson and Sundgren 1998; Roussel *et al.* 2004). For many species, the period following birth is termed as the "critical" or the "sensitive" period, referring to the fact that during this time the central nervous system can be modulated substantially and permanently as an adaptation to external factors (Liu *et al.* 1997).

In dogs, the neonatal environment consists of the dam, the littermates, the husbandry conditions and the interaction with humans. From the overview below it will be clear that insufficient or inappropriate exposure to these elements may lead to impairment in cognitive development, which can ultimately result in behavioral problems.

Initially, the bitch is the most important source for nutrition and immunity, the latter being provided by colostrum. A higher parity of the bitch affects the behavioral development of the offspring in a positive way (Wilsson and Sundgren 1998). Play fighting with its mother and littermates helps a pup to explore the boundaries of intra-specific communication and ensures bite inhibition. Furthermore, watching the behavior of the dam can also passively teach puppies certain skills, as was shown in working dogs by Slabbert and Rasa (1997). In a review, Overall (1997) stated that the optimal age for intra-specific socialization is 3 to 8 weeks postpartum. When weaning occurs earlier than 8 weeks postpartum, the process of intra-specific socialization by means of the dam is abruptly ended. In other species, early weaning has been shown to increase aggressive and abnormal behavior and to compromise development (Kikusui *et al.* 2004; Yuan *et al.* 2004). Isolation of animals after weaning can have further negative consequences, as shown by research in rats (Cooke *et al.* 2000; Roberts and Greene 2003). In addition, rats and mice, which are also social

species, show increased emotional reactivity and activity of the hypothalamus-pituitary-adrenal stress axis when put in social isolation (Spani *et al.* 2003; Weiss *et al.* 2004).

Research on several species has shown that the provision of visual, acoustic and olfactory stimuli promotes exploration, reduces aggression between group-housed animals, and reduces the development of behavioral abnormalities (Ödberg 1987; Ambrose and Morton 2000; Pluijmakers *et al.* 2003). In dogs, research has shown that providing toys, both for juvenile and for adult dogs, stimulates the development of motor skills and helps prevent boredom (Hubrecht 1993; Hubrecht 1995; Wells 2004).

Finally, the inter-specific socialization ensures that animals become less fearful and are easier to handle (Hemsworth *et al.* 1986; Weiss *et al.* 2004; Lansade *et al.* 2004). In dogs, brief handling sessions, starting at 5 weeks of age and ending at fourteen weeks of age, rendered puppies more approachable (Hubrecht 1995). The optimal time to socialize puppies with humans, according to a review by Case (1999), is six to eight weeks, though according to Overall (1997) this period ranges from five to twelve weeks. The recommended number of times neonatal dogs should be handled differs from author to author, but in general they agree that the total weekly duration can be limited. According to Fuller (1967), the handling of a litter for 20 minutes twice a week is appropriate, while Hubrecht (1993, 1995) carried out experiments involving the handling of dogs for 30 seconds per day. Wolfle (1990) obtained well-socialized dogs from 5-minute weekly contact periods. However, dogs enjoy and will seek human contact when given the opportunity (Wells and Hepper 1999; Wells 2004). Accordingly, Hubrecht (1995) advised that increasing these amounts of time might be beneficial.

The literature shows that the early postnatal period is critical for establishing intra- and inter-specific socialization, and that when this process is compromised, developmental and behavioral problems can occur at a later stage. This responsibility lies mainly with the breeder in that the bitch and the littermates should not be separated too soon and that there should be ample exposure to various stimuli, including human

contact. To date, no study exists documenting whether the conditions in which Belgian breeders raise and sell puppies meet the recommendations established on the basis of the scientific evidence. Accordingly, the aim of this study was to survey Belgian breeders and evaluate their methods of puppy socialization and education.

MATERIALS AND METHODS

Data collection

The authors evaluated the management conditions in Belgian dog breeding kennels. The complete survey consisted of eleven chapters containing a total of 267 questions. Eighteen questions specifically focused on the prevention of behavioral problems and are included in this paper, along with two additional questions (Table 1).

Most of the questions were to be answered with "yes" or "no", but some were multiple choice or open questions. Contact information for all licensed breeders was obtained from the Animal Welfare section of the Federal Public Service of Public Health, Food Safety and the Environment on July 6, 2003. Non-licensed breeders were contacted using advertisements found in animal magazines. Seventy-two breeders, who were selected on the basis of the number of breeding bitches in the kennels (derived from the kind of official license) and geographical spacing (in order to have a reflection of the Belgian situation), were contacted by telephone. Those who agreed to participate in the survey were visited. It took the participants about 90 minutes to complete the questionnaire.

Data processing and statistical analysis

The information was summarized in an Excel worksheet. The kennels were divided into two main categories, A and B, with up to ten and over ten breeding bitches, respectively. This classification is in accordance with that of the Belgian Government, in which group A corresponds with HK 11 and group B with HK 10 (Anonymous, 1997). In our study, category B was divided in subgroups Ba, Bb and Bc (kennels with 11 to 19, 20 to 99, and 100 or more breeding bitches, respectively), ultimately resulting in four groups: A, Ba, Bb and Bc. The software SPSS 11 for Windows was used to explore and analyze all of the data and to test for significant differences between the two main categories, A and B (non-parametric 2 independent

samples test), and between the different subgroups (non-parametric K independent samples test).

RESULTS

Description

Twenty-four licensed breeders opted not to participate. They mentioned reasons such as lack of time, hygienic issues and the fear that the information might be published and used by the official services. Of the other 48 breeders, 34 belonged to group A with the number of breeding bitches ranging from 1 to 9 (3.79 ± 2.63). Fourteen breeders belonged to group B, with 3 breeders in subgroup Ba, 9 in Bb and 2 in Bc. The number of breeding bitches varied between 15 and 185 (54.53 ± 45.57) in B, between 15 and 19 (17.00 ± 2.16) in Ba, between 20 and 65 (49.15 ± 12.51) in Bb, and between 120 and 185 (150.00 ± 42.43) in Bc. All the breeders answered every question in the questionnaire. The breeders in group A produced 489 puppies annually, and those in group B produced 5189 puppies.

For all the groups, the weaning age varied between 4 and 12 weeks. In general, weaning occurred most frequently at eight (29%), seven (25%) and six weeks (19%). The percentage in each subgroup is listed in Table 2. In one kennel, Chihuahua puppies are weaned at the age of twelve weeks, whereas the puppies of other breeds are weaned at seven weeks.

In group A, all the puppies stay together until they are sold, as is also the case for 86% of the kennels in group B. In group B, one breeder (7%) does this intermittently, while another (7%) never keeps the puppies together until they are sold. Fifteen per cent of the breeders in group A house different litters together, while 82% never do. Puppies from different litters have contact with each other in 66% of the kennels represented by group Ba, but never in any of the larger kennels. Puppies have contact with other adult dogs on a regular basis in 76% of the kennels in group A and in 36% of those in group B. In group Ba, this occurs in 66% of the kennels, in Bb in 33% and never in group Bc. The age at which first contact occurs is given in Table 3.

Prior to being sold, the puppies in 50% of the kennels in group A and in 29% of the kennels in group B have already met non-human animals other than dogs. In 97% of the kennels in group A and in 93% in group B the puppies have contact with and are manipulated by people at least once a day on a regular basis. Table 4 gives the ages at which this occurred. All breeders in

Table 1. Questionnaire that was sent to the breeders.

1. Most common weaning age:		
<input type="checkbox"/> 5 weeks	<input type="checkbox"/> 9 weeks	
<input type="checkbox"/> 6 weeks	<input type="checkbox"/> 10 weeks	
<input type="checkbox"/> 7 weeks	<input type="checkbox"/> 11 weeks	
<input type="checkbox"/> 8 weeks	<input type="checkbox"/> 12 weeks	
<input type="checkbox"/> older, what age...		
2. Do the pups stay together until they are sold?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
3. Are different litters put together at least once a day?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from ... weeks	
4. Do the pups have contact with other adult dogs?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from ... weeks	
5. Do the pups have daily contact with and are they manipulated by people ?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from ... weeks	
6. Do the pups have regular contact with new visual stimuli like TV, matches, fire, flashes, moving objects?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from ... weeks	
7. Do the pups have regular contact with new auditory stimuli such as lawn mower, tractor, radio, vacuum cleaner, chain saw, etc.?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from ... weeks	
8. Do the pups have regular contact with new olfactory stimuli?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from... weeks	
9. Do you provide toys?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	What toys and from what age:?	
10. Do you visit unfamiliar locations with the pups?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	from weeks	
	what places and from what age?	
11. At what age are most puppies sold?		
<input type="checkbox"/> 5 weeks	<input type="checkbox"/> 10 weeks	
<input type="checkbox"/> 6 weeks	<input type="checkbox"/> 11 weeks	
<input type="checkbox"/> 7 weeks	<input type="checkbox"/> 12 weeks	
<input type="checkbox"/> 8 weeks	<input type="checkbox"/> older, how old	
<input type="checkbox"/> 9 weeks		
12. Do you give advice regarding the education of the dog?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
13. Do you advise the new owner to visit a dog training school?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
14. What happens to the last pup of a litter?		
a. it stays alone	<input type="checkbox"/> yes	<input type="checkbox"/> no
b. it stays with the mother or another adult dog	<input type="checkbox"/> yes	<input type="checkbox"/> no
c. it is put in another litter	<input type="checkbox"/> yes	<input type="checkbox"/> no
d. it is taken into the house	<input type="checkbox"/> yes	<input type="checkbox"/> no
15. Prior to sale, do the puppies have contact with other animal species?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
16. Prior to sale, do the puppies have contact with people other than the caretakers (e.g. neighbors, friends, children, visitors)?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
17. If not, is there a specific reason for this (e.g. health concerns, not yet vaccinated yet, etc.)?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	What reason(s)?	
18. Have you ever refused to sell a dog to somebody?		
	<input type="checkbox"/> yes	<input type="checkbox"/> no
	If yes, why?	
Other questions, the answers to which were used in this article:		
19. How many breeding bitches do you have?		
20. Do you participate in dog shows?		

Table 2. Age (in weeks) at which puppies were weaned

Kennel size	N	Percentage of kennels that wean pups at weeks of age					
		four	five	six	seven	eight	nine
A (1-10)	34	3	21	18	24*	26	9
B (> 10)	14	0	7	21	29	36	7
Ba (11-19)	3	0	0	0	0	66	33
Bb (20-99)	9	0	11	33	33	22	0
Bc (100)	2	0	0	0	50	50	0

* in one kennel (only) the chihuahua pups were weaned at 12 twelve weeks of age, and the other pups at seven.

Table 3. Age (in weeks) at which puppies have first contact with adult dogs other than the dam.

Kennel size	N	Percentage of breeders that wean puppies at ... weeks of age										
		birth	one	two	three	four	five	six	seven	eight	no contact	unknown
A (1-10)	34	3	0	0	24	6	26	9	0	6	6	0
B (> 10)	14	7	0	0	0	0	7	14	0	0	64	7
Ba (11-19)	3	33	0	0	0	0	0	33	0	0	33	0
Bb (20-99)	9	0	0	0	0	0	11	11	0	0	66	11
Bc (100)	2	0	0	0	0	0	0	0	0	0	100	0

Table 4. Age (in weeks) at which puppies have first contact with and/or are manipulated by people.

Kennel size	N	Percentage of breeders that expose pups to humans from ... weeks of age							
		birth	one	two	three	four	six	eight	no contact
A (1-10)	34	41	21	6	15	9	3	3	3
B (> 10)	14	64	7	7	7	0	7	0	7
Ba (11-19)	3	100	0	0	0	0	0	0	0
Bb (20-99)	9	56	11	11	0	0	11	0	11
Bc (100)	2	50	0	0	50	0	0	0	0

Table 5. Percentage (%) of breeders providing pups with different novel visual, auditory and olfactory stimuli.

Kennel size	N	Percentage (%) of breeders providing pups with different novel visual, auditory and olfactory stimuli		
		Visual	Auditory	Olfactory
A (1-10)	34	68	88	71
B (> 10)	14	21	71	43
Ba (11-19)	3	33	100	100
Bb (20-99)	9	22	66	33
Bc (100)	2	0	50	0

Table 6. Age of exposure of pups to novel stimuli.

Type of stimulus	Kennel size	Percentage of breeders that expose pups to novel stimuli at ... weeks of age										
		birth	one	two	three	four	five	six	seven	eight	no contact	unknown
Visual	A	18	6	3	18	12	6	3	0	3	31	
	B	7	7	0	0	7	0	0	0	0	79	
Auditory	A	38	12	0	18	6	3	6	0	3	12	3
	B	64	0	7	0	0	0	0	0	0	29	
Olfactory	A	3	15	21	15	6	3	6	0	3	29	
	B	0	0	0	7	14	0	21	0	0	57	

groups Ba and Bb responded affirmatively, while in group Bc only 50% did. The breeder that refused early contact mentioned hygiene as the main reason for this.

Table 5 presents the percentage of the breeders who provide unfamiliar visual, auditory and olfactory stimuli to the puppies. Table 6 shows the average age at first contact with novel stimuli. 68% of the breeders in group A and 33% in group Ba provide unfamiliar visual stimuli on a regular basis, whereas 22% do so in groups Bb and none did so in Bc. None of the five largest kennels (> 50 bitches) expose puppies to unfamiliar visual stimuli. A similar distinction between the subgroups of category B is noted regarding the olfac-

tory stimuli, where all breeders from Ba said they provide puppies with this type of enrichment, whereas this is only the case for 33% of the kennels in group Bb and none in group Bc. Unfamiliar auditory stimuli are provided in 88% (A), 100% (Ba), 66% (Bb) and 50% (Bc) of the kennels, respectively.

Toys are available in 91% of the kennels in group A. They are provided regularly in 33% of the kennels, starting when the puppies are 3 weeks of age, 33% at 4 weeks and 33% at 5-6 weeks. The toys consist mainly of ropes, plastic bottles, rubber toys, and, less often, Kong ® (a rubber toy that can be filled with treats), plush toys, cardboard boxes and pieces of wood. As for group B, all breeders in Ba, 34% of the breeders in

Table 7. Age at which pups leave the kennel.

Kennel size	N	Percentage of breeders whose pups leave the kennel at weeks of age								
		six	seven	eight	nine	ten	eleven	twelve	thirteen	fourteen
A (1-10)	34	0	38*	35	15	3	3	6*	0	3
B (> 10)	14	7	28	50**	14	0	0	7**	0	0
Ba (11-19)	3	0	0	33	66	0	0	0	0	0
Bb (20-99)	9	11	33	56*	0	0	0	11*	0	0
Bc (100)	2	0	50	50	0	0	0	0	0	0

* in one breeding kennel the Chihuahua pups leave at 12 weeks of age; in the others they leave at 7 weeks of age.

** in one breeding kennel the pups leave at eight weeks of age if their destination is the Belgian market, and at twelve weeks of age when they are exported to France.

Table 8. Training advice to future pup owners.

Kennel size	N	Percentage of kennel owners that give training advice to future pup owners	
		general advice	advice to go to a dog school
A (1-10)	34	97	82
B (> 10)	14	71	50
Ba (11-19)	3	100	66
Bb (20-99)	9	56	44
Bc (100)	2	100	50

Bb and 50% in Bc provide toys: mostly ropes, plastic bottles and rubber toys. One breeder starts at 3-4 weeks, another at 6 weeks and one at 8 weeks, while the other 44 did not list the age at which this occurs.

In 47% of the breeding kennels of group A the puppies visit unfamiliar places, starting at 4 weeks (9%), 5 weeks (6%), 6 weeks (15%), 7 weeks (9%), and 8, 10 and 12 weeks of age (3% each). Novel locations include the street, the market or mall, obedience school, a forest or park, the fair, the vet or a friend's house. Two breeders take the puppies for car rides. They usually visit 2 or 3 different areas. Except for one (11%), no breeders in group B take the puppies to unfamiliar locations.

Table 7 shows the age at which most puppies leave the breeding kennel after having been sold. One breeder in group A said that the timing as to when the pups can be sold depends on the breed: Chihuahuas at 12 weeks, and the other breeds at 7 weeks. One breeder in subgroup Bc indicated that this timing differs according to the location the puppies are going to: if the puppies are being exported to France, then they stay until they are 12 weeks old, instead of the 8 weeks when they are being sold in Belgium.

Table 8 shows whether advice regarding the education of the puppies is given and whether the owner is advised to go with the pup to dog obedience school.

The last pup remains alone in 18% of the breeding kennels in group A, in 62% of the kennels the mother

Table 9. Factors that are important in the prevention of problem behavior in puppies in the process of socialization (based on Overall 1997, Hubrecht 1995 and Pluijmakers 2003).

<p>Intra-specific socialization</p> <ul style="list-style-type: none"> • No weaning before 8 weeks of age • Contact with other adult dogs and other pups • No isolation after weaning. <p>Habituation</p> <ul style="list-style-type: none"> • Regular exposure to novel visual, acoustic and olfactory stimuli • Provision of toys <p>Inter-specific socialization</p> <ul style="list-style-type: none"> • Regular handling by different people • Regular contact with other species of non-human animals

stays with him, in 6% he is mixed with another litter, and in 65% he is taken into the breeder's home. Fifty per cent of the breeders who responded that the pup stays alone, take it into the house. In group B, one breeder had an all-out system where all the pups were sold together to a grocer. In the same group the last pup stays alone in 21%, with the mother in 36%, is added to another litter in 36%, or is taken into the breeder's home in 14%. One breeder among those where the last pup remains alone, takes it into his home.

For group A, 82% of the breeders had refused to sell a pup to a particular buyer before, whereas this was 17% for group B. Both groups mentioned the same kinds of reasons: the future owner was financially unable to care for the dog, did not provide proper housing, had the wrong motivation for buying a certain breed, did not know anything about the breed or was in general found not suitable to be responsible for a dog.

Statistical analysis

The statistical analysis provides significant evidence ($p < 0.05$) that a greater variety of visual stimuli is given than in group A than in group B. A significant difference was found regarding contact with adult people, the provision of unfamiliar visual stimuli and toys,

the age when visits are made, the advice to go to dog schools, putting the last pup in another litter, and bringing the last pup into the house ($p < 0.05$ in all cases). The mean ranks are highest in group A except for putting the last pup in another litter.

Between the four subgroups, significant differences exist regarding contact with adult people, the provision of unfamiliar visual stimuli and of toys, and putting the last pup in another litter ($p < 0.05$ in all cases). Regarding contact with adult people and the provision of unfamiliar visual stimuli and of toys, the mean rank was highest in group A, followed by Ba, Bb and Bc. For the trait "putting the last pup in another litter", the mean rank of group Bc differs consistently from all three other subgroups.

The correlations indicate that breeders who provide more types of visual stimuli also provide more types of auditory stimuli ($r = 0.70$; $p < 0.001$). The younger the age at which puppies get toys, the earlier they are exposed to unfamiliar people ($r = 0.65$; $p < 0.05$). A negative correlation exists between the number of places visited and the age of the first visit ($r = -0.50$; $p < 0.05$). No other significant correlations are found.

DISCUSSION

The aim of this study was to evaluate the Belgian breeders' methods of puppy socialization and education. The data collected were compared with the recommendations for obtaining good socialization as formulated in the literature and as summarized in Table 9.

Neither in group A nor in group B do different litters have contact with one another on a regular basis, possibly because of the absence of other litters in group A. However, hygiene and time management can also play a role, especially in B. Regarding the contact with other adult dogs, the results of groups A and Ba are very similar and differ notably from those of Bb and Bc, where the lack of contact could be a considerable risk factor for the development of sufficient self-control by the puppies, as suggested by Giffroy (personal communication, 2000). In general, there also is less contact with other non-human animals, especially in the larger breeding kennels (50% contact in A, and 29% in B). The development of normal socialization towards other non-human animals will therefore depend largely on the efforts made by the later owner. It is likely that the dogs will be fearful of unfamiliar species as adults or that, to the contrary, they will consider certain domestic species (cats, pet rabbits and rodents) as prey (Giffroy, personal communication, 2000). The same pattern may also lead to aggressive behavior in their contacts with unfamiliar humans

Given the recommendation that visual, auditory and olfactory stimuli as well as toys must be provided to the pups in order to achieve a correct habituation process (Pluijmakers 2003), there is serious concern regarding the absence of the regular provision of these stimuli in many of the kennels that were visited. Even though the general situation is better in the smaller kennels than in the larger ones, all breeders should be urged to augment the efforts made in this area. It is to be expected that when the future owners do not pay sufficient attention to this item, many of the pups will develop anxiety problems (Pluijmakers 2003). Based on the data obtained in this study, it seems that the environment is better adapted to accommodate the socialization of puppies in the smaller breeding kennels at this age.

Breeders from both groups pay insufficient attention to habituating puppies to unfamiliar locations. It is alarming to find out that in 89% of the kennels in group B, the pups never leave the kennel environment to visit an unfamiliar place. A negative effect on socialization can be expected when the puppies stay in these kennels beyond the critical period in their emotional development (Pluijmakers 2003). The fact that in some kennels the puppies are 12 weeks and older before they leave the kennel is a reason for serious concern. Especially the one Bb kennel where puppies are raised in poor environmental conditions and later exported at the minimum age of 12 weeks – all in accordance with current Belgian and international legislation – is worrying to the authors.

Our results show that the early environment in which puppies are raised is often inadequate, and this environment can negatively affect the behavior of the animals as adults. It is possible that the breeders are unaware of the appropriate conditions suggested in the scientific literature, which often does not reach popular magazines available to the public. To improve this situation, the first step would be to provide the lacking information. This could be accomplished by means of a formal training course dealing with canine problem behavior in which the course content would be adapted according to kennel size. In this study, group A and subgroup Ba very often showed similar characteristics and therefore could be grouped together into a single category. Efforts to obtain good socialization seem to diminish in larger kennels, and this problem needs to be addressed through proper training.

The authors acknowledge that the evaluation carried out in the process of licensing a breeder by the government should be based on the entire questionnaire rather than only on the parameters distilled from the 20 questions discussed in this study. The authors suggest that a study on a larger scale should be done to confirm the existence of inadequate conditions regarding good socialization in Belgian breeding kennels. If this is the case, more stringent criteria should be incorporated in the Royal Decree on the Certification of Dog Breeding Kennels (Anonymous 1997) in order to prevent behavioral problems in dogs. Meanwhile, however, it is essential to emphasize to the new owners of the puppies the importance of a good socialization plan to limit the damage that could result from the inadequate environmental conditions that currently exist in a high percentage of the examined kennels in Belgium. A final remark can be made regarding the sample size in this study. In Belgium there are no accurate data sets on the number of dog breeders. However, it is known that the Belgian authorities licensed 663 breeders on 6 June 2003. Among them, 170 had an HK10 label (our group B) and 493 an HK11 label (our group A) (FPS of Public Health,

Food Safety and Environment, Animal Welfare section, personal communication, 2003). In 2002, in 148 breeding kennels with the HK10 label, 53,873 puppies were identified, as compared to 9,953 puppies in 321 HK11 labeled kennels (FPS of Public Health, Food Safety and Environment, Animal Welfare section, source BVIRH, personal communication, 2004). In group A in this study, the number of puppies produced was notably lower than could be derived from the BVIRH data. One possible explanation could be that in this study, group A includes three smaller, non-licensed breeders and that the BVIRH statistics only include licensed breeders. In any case, the results found in our study could be used as a starting point for a more elaborate investigation in this neglected area of research.

ACKNOWLEDGEMENTS

The authors wish to thank Prof. F.O. Ödberg of the Faculty of Veterinary Medicine at Ghent University and Prof. Dr. J.M. Giffroy and Dr. C. Diedrich of the Faculty of Veterinary Medicine at the University of Notre Dame de la Paix in Namen for their remarks on the questionnaire, as well as Linda Gielen for the valuable help in collecting the data. This study was sponsored by a number of pharmaceutical and pet food companies.

REFERENCES

- Ambrose N., Morton D.B. (2000). The use of cage enrichment to reduce male mouse aggression. *Journal of Applied Animal Welfare Science* 3, 117-125.
- Anonymous (1997). Koninklijk besluit houdende de erkenningsvoorwaarden voor hondenkwekerijen, kattenkwekerijen, dierenasielen, dierenpensies en handelszaken voor dieren, en de voorwaarden inzake de verhandeling van dieren. 17.02.1997 *Belgisch Staatsblad*: 24-05-1997 p.13402-13426
- Brenoe U.T., Larsgard A.G., Johannessen K.R., Uldal S.H. (2002). Estimates of genetic parameters for hunting performance traits in three breeds of gun hunting dogs in Norway. *Applied Animal Behaviour Science* 77, 209-215.
- Case L.P. (1999). *The Dog: Its Behavior, Nutrition and Health*. First edition. Iowa State University Press, Iowa, p.71-73.
- Cooke B.M., Chowanadisai W., Breedlove S.M. (2000). Post-weaning social isolation of male rats reduces the volume of the medial amygdala and leads to deficits in adult sexual behavior. *Behavioural Brain Research* 117, 107-113.
- Fuller J.L. (1967). Experiential deprivation and later behavior. *Science* 158, 1645-1652.
- Fuller J.L., Clark L.B. (1968). Genotype and behavioral vulnerability to isolation in dogs. *Journal of comparative and physiological psychology* 66, 151-156.
- Hafez E.S.E. (1969). *The Behaviour of Domestic Animals*. Second edition. Baillière,
- Hay D.A., Singleton G.R. (1980). Genetics and maternal experience in the aggression of wild and laboratory mice. *Aggressive Behavior* 6, 266.
- Hemsworth P.H., Barnett J.L., Hansen C., Gonyou H.W. (1986). The influence of early contact with humans on subsequent behavioural response of pigs to humans. *Applied Animal Behaviour Science* 15, 55-63.
- Hubrecht R.C. (1993). A comparison of social and environmental enrichment methods for laboratory housed dogs. *Applied Animal Behaviour Science* 37, 345-361.
- Hubrecht R.C. (1995). Enrichment in puppyhood and its effects on the later behavior of dogs. *Laboratory Animal Science* 45, 70-75.
- Jacobs N., Myin-Germeys I., Derom C., van Os J. (2004). A new paradigm in behaviour genetics: genotype-environment interaction in the flow of daily life. *European Psychiatry* 19, 41.
- Kikusui T., Takeuchi Y., Mori Y. (2004). Early weaning induces anxiety and aggression in adult mice. *Physiology and Behavior* 81, 37-42.
- Lansade L., Bertrand M., Boivin X., Bouissou M.-F. (2004). Effects of handling at weaning on manageability and reactivity of foals. *Applied Animal Behaviour Science* 87, 131-149.
- Liu D., Diori J., Tannenbaum B., Caldji C., Francis D., Freedman A., Sharma S., Pearson D., Plotsky P.M., Meaney M.J. (1997). Maternal care, hippocampal glucocorticoid receptors and hypothalamic-pituitary-adrenal responses to stress. *Science* 277, 1659.
- Ödberg, F.O. (1987). The influence of cage size and environmental enrichment on the development of stereotypes in bank voles (*Clethrionomys glareolus*). *Behavioural Processes* 14, 155-173.
- Overall K.L. (1997). Normal Canine Behavior. In: *Clinical Behavioral Medicine for Small Animals*. Mosby, St. Louis 9-44.
- Pluijmakers J, Appleby D., Bradshaw .(2003) Sensitive periods in the development of behavioural organization and the role of emotional homeostasis. *Proceedings of the 4th International Veterinary Behavioural Meeting*, Caloundra, Australia
- Roberts L., Greene J.R.T. (2003). Post-weaning social isolation of rats leads to a diminution of LTP in the CA1 to subiculum pathway. *Brain Research* 991, 271-273.
- Roussel S., Hemsworth P.H., Boissy A., Duvaux-Ponter C. (2004). Effects of repeated stress during pregnancy in ewes on the behavioural and physiological responses to stressful events and birth weight of their offspring. *Applied Animal Behaviour Science* 85, 259-276.
- Schoenecker B., Heller K.E. (2000). Indication of a genetic basis of stereotypes in laboratory-bred bank voles (*Clethrionomys glareolus*). *Applied Animal Behaviour Science* 68, 339-347.
- Slabbert JM, Rasa O. (1997) Observational learning of an acquired maternal behaviour pattern by working dogs: an al-

- ternative training method? *Applied Animal Behaviour Science* 53, 438-481.
- Stanley W.C., Elliot O., (1962). Differential human handling as reinforcing events and as treatments influencing later social behavior in Basenji puppies. *Psychological Reports* 10, 775-788.
- Weiss I.C., Pryce C.R., Jongen-Relo A.L., Nanz-Bahr N.I., Feldon J. (2004). Effect of social isolation on stress-related behavioural and neuroendocrine state in the rat. *Behavioural Brain Research* 152, 279-295.
- Wells D.L. (2004). The influence of toys on the behaviour and welfare of kennelled dogs. *Animal Welfare* 13, 367-373.
- Wells, D.L., Hepper P.G. (1999). Male and female dogs respond differently to men and women. *Applied Animal Behaviour Science* 61, 341-349.
- Wilsson E., Sundgren P.E. (1998). Effects of weight, litter size and parity of mother on the behaviour of the puppy and the adult dog. *Applied Animal Behaviour Science* 56, 245-254.
- Wolfe T.L. (1990). Policy, program and people: the three Ps to well-being. *Canine Research Environment*, ed. A. Mench and L. Scientists Center for Animal Welfare. pp.41-7.
- Yuan Y., Jansen J., Charles D., Zanella A.J. (2004). The influence of weaning age on post-mixing agonistic interactions in growing pigs. *Applied Animal Behaviour Science* 88, 39-46.

Uit het verleden

DE DUIVEL VERMOMD ALS VEEARTS

Misschien wel de vroegste verschijning van een dierenarts in de christelijke literatuur werd gerapporteerd door de kerkvader Gregorius de Grote in een beschrijving van het leven van de heilige Benedictus. Deze stichter van het westerse monnikendom beleefde in de zesde eeuw op weg naar de Monte Cassino een nogal zonderlinge ontmoeting met de duivel (de Oude Vijand genoemd) vermomd als veearts (mulomedicus, letterlijk muilnierarts).

Dat ging als volgt: Toen hij (Benedictus) op zekere dag naar de kapel trok van de heilige Johannes op de top van de berg, kwam hij de duivel tegen in de gedaante van een veearts. Die had een drinkhoorn bij zich en een pootkluis-ter. Benedictus vroeg hem waar hij naar toe ging en de duivel antwoordde: "Ik ga naar je broeders een drankje brengen". De eerbiedwaardige Benedictus ging verder om te bidden in de kapel en na zijn gebed keerde hij ongerust terug. De boze geest had intussen een oudere monnik getroffen, wierp hem op de grond en kwelde hem allerheftigst. Toen de man Gods zag hoe wreed de monnik gekweld werd, gaf hij hem een oorvijg en verdreef daarmee de boze geest. Die waagde het nadien niet meer terug te keren.

De attributen van de veearts zijn duidelijk: de pootkluis-ter waren nodig om de beesten te immobiliseren en de drinkhoorn was sinds eeuwen in gebruik om geneesdrankjes toe te dienen. Maar waarom in 's hemelsnaam (als we die uitdrukking hier mogen gebruiken) voerde de overlevering de duivel op als dierenarts? In het algemeen immers werd de demon voorgesteld als een afzichtelijk creatuur, een buitengewoon kwaadaardig mens, een monster. Was het dan zo erg gesteld met de veeartsenreputatie in die tijd? De geleerde abt aan wie we dit verhaal ontleenden, meende, hopelijk terecht, twee meer aannemelijke verklaringen te kunnen geven. De kapel op de top verving er een oude Apollotempel en de hele omgeving had in die tijd nog voor een stuk zijn heidense sacrale aantrekkingskracht behouden. De daar vereerde godheid zou Apollo Lykeios, beschermer van het vee, kunnen zijn. Vandaar dus de personificatie als dierenarts. Een tweede mogelijkheid zou zijn dat de veearts hier opgevoerd werd als tegenbeeld van Benedictus, de ware (zielen)arts van zijn monnikenkudde. De goede herder (pastor) van zijn kudde, tegenover de slechte.

Bron:

Mathijssen, G. (1985). Een raadselachtig dierenarts. De mulomedicus uit de Vita Sancti Benedicti. In: van der Horst, K., Koolmees, P.A., Monna, A. (eds.). *Over beesten en boeken*, Erasmus Publ., Rotterdam, 229-240.