MEDWELL PUBLISHING
Journal of Animal and Veterinary Advances 8 (2): 336-342, 2009
ISSN: 1680-5593

Factors Linked to Dominance Aggression in Dogs

[1]Joaquín Pérez-Guisado and [2]Andrés Muñoz-Serrano
[1]Departamento de Medicina y Cirugía Animal, [2]Departamento de Genética,
Facultad de Veterinaria, Universidad de Córdoba, Campus de Rabanales, 14071 Córdoba, Spain

Abstract: The aim of this study was to determine factors that might be linked to dominance aggression in pet dogs. Our results show that possession aggression is the first manifestation of dominance aggression and its basic form. Modifiable and non-modifiable factors that are associated with higher levels of dominance aggression and depend on the owner include first time ownership, a lack of obedience training, the owner not being the main obedience trainer, spoiling the dog, not using physical punishment, acquisition as a present, as a pet, impulsively, or to guard and spaying female dogs. Modifiable factors have the greatest influence on dominance aggression in dogs. Dog-dependent factors (gender, breed, age, size and coat color) are fewer than owner dependent factors. There was an association between certain dog behaviour patterns and higher level of dominance aggression.

Key words: Aggressiveness, behaviour, problems, breed, coat colour, dominance

INTRODUCTION

Dominance aggression is the most common form of aggression (Beaver, 1983; Polsky, 1996) and up to 59.2% of aggressive dogs have been reported to have dominance aggression (Beaver, 1983). Dominance or competition aggression is a form of aggression towards family members (people and other dogs) in which the dog fights for a higher hierarchical position within the family (Landsberg *et al*., 1998).

The dog usually singles out certain family members, it wants to dominate (Landsberg *et al*., 1998; Polsky, 1996) and may target one or more family members. It is suggested, that a more compliant family member might be victimised more often than someone who is firm with the dog but some dominantly aggressive dogs challenge the more forceful family members instead (Overall, 1999). Others believe a dominant dogs typically shows no aggression towards a person who is clearly dominant or submissive because the dog would prefer to challenge people with no definite hierarchical position (Uchida *et al*., 1997).

In dominance aggression, the dog tends to attack family members in order to protect possessions it considers vital, or as a form of resistance to dominance signals emitted by another member of the family (Wright 1991). This definition includes the concepts of both possession and dominance aggression. In fact, many authors include situations of possession aggression when evaluating dominance aggression (Beaver, 1983; Crowell-Davis, 1991; Dodman *et al*., 1996; Uchida *et al*., 1997; Wright, 1991), they consider possession aggression to be an expression of dominance aggression.

The behavior of the owner towards the dog can favour dominance aggression. Approximately 40% of dominance aggression situations are linked to non-authoritarian dog owners, who have carried out only minimal basic obedience training with the dog or even none at all (Grognet and Parker, 1992). Dogs that show dominant aggressive behaviour towards their owners have been usually spoiled, treated like human beings (O'Farrell, 1997). Such dogs, for example, may have been allowed to get on the bed or armchair, sleep on the family's bed and given extra food from the family's meals.

Having in mind that dominance aggression is the most common form of dog aggression and is such an important problem (Beaver, 1983; Polsky, 1996), the aim of this study was to determine which factors might be linked to dominance aggression and thus aid in understanding and controlling this phenomenon in pet dogs.

MATERIALS AND METHODS

Study sample: A total of 711 dogs (354 males and 357 females, 594 purebred and 117 mixed breeds) older than 12 months were assessed by an interview with their owners.

The study was carried out in 5 cities in Spain (Almeria, Cordoba, Granada, Jaen and Madrid) with a total

Corresponding Author: Joaquín Pérez-Guisado, Departamento de Medicina y Cirugía Animal, Facultad de Veterinaria, Universidad de Córdoba, Campus de Rabanales, 14071 Córdoba, Spain

population of about 5 million people. The interviewer was always the same person (male, veterinary, 28 years old) and the dogs lived with their owners. Interviews were carried out with dog owners who were taking their pets for a walk. Subjects were opportunistically selected (owners who were taking their dogs for a walk) 62% of the owners approached agreed to participate in the study. The interviewer was well trained to classify each dog through its morphological characteristics in each corresponding breed. So, the interviewer verified the owner's information about the breed of the dog.

Every breed studied had a minimum of 4 dogs. The 594 dogs that were assessed belonged to 47 pure breeds, grouped according to the world canine association (FCI = Fédération Cynologique Internationale) categories.

The mixed and pure breed dogs were classified into three categories: small (>10 kg), medium (10-20 kg) and large (>20 kg). Intact dogs constituted 92.54% of the population. The English cocker spaniels were subdivided into 3 different groups (blonde, black and particolour) since several studies have observed a relationship between the colour of an English cocker Spaniel's coat and its level of aggression.

This study was reviewed and approved by the department of veterinary medicine and surgery (University of Cordoba).

Description of the survey: The survey gathered information on 72 variables many of which were significantly linked to dominance aggression. However, this study will only discuss the most significant associations, certain variables that have been reported as significant by other authors and those that were considered by this study to be of particular interest.

We assessed the dog's level of dominance aggression through 9 situations from a list of situations that are used to estimate a dominance score in the dog (Uchida *et al*., 1997; Guy *et al*., 2001a). Owners are rarely able to report the motivation of their dogs behaviour with any accuracy, therefore, we showed the owners 2 photos: A typical dog with dominance aggression postures (erect, stiff posture, the tail held high and the ears erect and tilted forward) and a typical dog with a fearful motivated posture (lowering its head, flattening its ears against its head, tucking its tail between its legs and avoiding eye contact). We considered a situation to be a positive instance of dominance aggressive behaviour when the dog was growling, snapping, biting or baring its teeth towards family members and the owner was sure that the situation happened with the typical dog dominance aggression postures showed in the photo. The dog was awarded a score of between 0-9 points according to the number of these situations that elicited the behaviour. These situations were:

- Disturbing the dog while it was resting.
- Trying to take away the dog's bone, rawhide, toy or a stolen object
- Touching the dog's food or adding food to its dish, while it was eating
- Walking by the dog when, it had a bone/rawhide bone/toy or when, it was eating
- Staring at the dog
- Handling the dog: physically waking the dog; lifting the dog; petting the dog; handling the dog's face or mouth; handling the dog's paws; trimming the dog's toenails; grooming the dog; bathing or towelling it off; taking off or putting on its collar; pulling the dog back by its collar or scruff; reaching for or grabbing the dog by the collar; holding the dog by its muzzle
- When someone from the family tried to enter or leave the building
- Restraining or punishing the dog when it wanted to go somewhere or to do something that was forbidden: for example physically or verbally removing the dog from furniture; reprimanding the dog in a loud voice; visually threatening the dog with a newspaper or hand
- Impeding the movements of its human family within the home

We assessed the dog's tendency to bite during the previous situations (if the dog bit, one point was awarded). Hence, the score for the dog's tendency to bite was rated between 0 and 9 points. We consider 4 groups for the dog's tendency to bite: High (>4), medium (3-4), low (1-2) and null (0).

We also assessed how spoiled the dog was, based on 5 situations (giving it extra food from the family's meals when they were eating; allowing it to lie on the sofa/armchair/chair; allowing it to get on the bed; allowing it to sleep in the bedroom; allowing it to sleep on the bed with the owner). If the answer was affirmative, 1 point was awarded; hence, the score for spoiling ranged between 0 and 5 points.

We consider a dog to have received basic obedience training when the owner reported that it responded to at least 3 orders, such as: come, sit (lie) down, leave (an object it has in its mouth), stay, wait and so on.

Statistical analysis: The dogs obtained a score of between 0 and 9 points for dominance aggression. In

order to study discontinuous variables, 3 groups of dominance aggression were created: low (0-2 points), medium (3-6 points) and high (7-9 points). Variables were analyzed independently, nevertheless four variables (dog sex, dog age, dog breed and neutered status) were locked during statistical analysis of each variable due to their potential to act as confounders because they are highly significant variables and other variables studied may depend on them. SAS (2000) was applied in order to carry out the following statistical analyses:

- Continuous Variables (CV) were analysed using analysis of variance in order to determine if there were any significant differences. If significant differences were observed, Duncan's test was used to determine the number of statistically significantly groups
- Discontinuous Variables (DV) were analysed using Chi-square contingency table analysis. The percentage of dogs of each group of dominance aggression were analysed within each discontinuous variable class. The DV results are summarized for the high level of dominance aggression group (7-9 points)

RESULTS

Interview completion: The average time taken to complete an interview was 28 min.

Factors analysed: There were no factors with a significance level between 0.05 and 0.001.

Highly significant factors (p<0.001): Highly significant factors and its components with higher levels of dominance aggression are shown in Table 1. The dominance aggression mean score of 10 factors are dependent on other factors (Table 1): Breed, dog's size, owner's sex, owner's age, other pets in the family (any pets), first time ownership, owner's level of education, type of food, how often the dog is fed, the total time the owner spends with the dog.

Insignificant factors (p>0.05): Factors that were not significant were: Children in the family, the main person who fed, walked or played with the dog, playing competitive games with the dog, the dog's favourite games, the age of the dog when it was adopted by the owner and the place from which, it was acquired, whether

Table 1: Highly significant factors (p<0.001)

Factors	Higher levels of dominance aggression
Dog's sex (CV)	Males
FCI groups (CV)	8, 9, 3, 2
Breeds[1] (CV)	Neapolitan Mastiff, Blonde English Cocker Spaniel, Fox Terrier and Miniature Poodle
Dog's size[2] (CV)	Small dogs (<10 kg) and medium dogs (10-20 kg)
Dog's age (CV)	5-7 years
Owner's sex[3] (CV)	Female owner
Owner's age[4] (CV)	Younger owners (<30 years)>30-65>elderly (≥65)
Number of family members (CV)	1 and ≥3 family members
Other pets in the family (any pets)[5] (CV)	Dogs that do not live with other animals in the family
First time ownership[6] (CV)	Dogs belonging to first time owners
Obedience training (CV)	Dogs without obedience training
The main obedience trainer (CV)	Not the owner
How spoiled the dog is (CV)	Most spoiled dogs
Type of punishment used with the dog (CV)	Verbal
Owner's level of education[7] (CV)	Higher level of education (University degrees)
The purpose for which the dog was acquired (CV)	A present, as a pet, impulsively, for guarding or for defending
Castration inside the sex factor (CV)	Castration increases dominance aggression in females and in male dogs decreases this behaviour
Type of food[8] (CV)	Wet dog food
How often the dog is fed[9] (CV)	Dog's food is left out indefinitely
The time the dog spends eating (CV)	Dogs spend more time eating
The time the owner spends walking the dog (CV)	Little time
The total time the owner spends with the dog[10] (CV)	Little time
If the dog is currently suffering from an illness (CV)	Sick dogs
The dog's tendency to bite (CV)	High tendency to bite
Dog's biting preferences (DV)	Family members
Which family member the dog tends to bite (DV)	Single owner
Which body parts are most frequently attacked (DV)	Upper limbs

*Factors with the upper index number depend on these factors: Obedience training[1, 2, 3, 5, 6, 7, 8, 9], how spoiled the dog is[1, 2 3, 5, 6, 7, 8, 9], the type of punishment used with the dog[1, 2, 3, 5, 6, 7, 8, 9], the time the owner spends walking the dog[1, 2, 5, 7, 9] and the total time the owner spends with the dog[1, 2, 7], dog's size[1, 8, 9], the time the owner spends walking the dog[10]; CV = Continues Variable; DV = Discontinues Variable

the dog had passed from one owner to another, whether it had suffered an illness during the first 16 weeks of life and whether the dog barked a lot, or the owner described the dog as stubborn or nervous.

DISCUSSION

They consider possession aggression to be an expression of dominance aggression (Beaver, 1983; Crowell-Davis, 1991; Dodman *et al*., 1996; Uchida *et al*., 1997; Wright, 1991; Pérez-Guisado *et al*., 2008c) or different types of aggression that are independent, but they can be linked (Overall, 1999; Borchelt and Voith, 1982). Levels of dominance aggression were assessed through 9 situations; the first 3 correspond to possession aggression and the other 6 correspond to pure dominance aggression. The results revealed that 100% of dogs that displayed pure dominance aggression in at least one of the situations also scored positively in the 3 situations of possession aggression (giving a final score of 4 points or more). It is also interesting to observe that in the global evaluation of dominance aggression, 100% of dogs that scored positively in 3 or less situations of dominance aggression (gaining a final score of 3 points or less) only display this behaviour in situations of possession aggression. These results might shown that possession aggression is really dominance aggression and is the first and most basic manifestation of dominance aggression. Certain authors argue that they are separate forms of aggression since a dog can display possession aggression without dominance aggression (Overall, 1999). However, this study demonstrates, the link between the two forms of aggression, showing that the most basic characteristics of dominance aggression are found in situations related to possession aggression. Possession aggression does not necessarily evolve into typical dominance aggression. However, it is always the starting point leading towards greater manifestations of dominance aggression since, in these situations, possession aggression is always involved. In fact, certain studies claim that many dog owners whose pet displays dominance aggression remember that their dogs had possessive problems (associated with food) when they were puppies (Crowell-Davis, 1991).

The results of this study (Table 2), support the view expressed by many authors that dominance aggression problems are much more common in male then female dogs (Borchelt, 1983; Cameron, 1997; Crowell-Davis, 1991; Overall and Love, 2001; Pérez-Guisado *et al*., 2006, 2008a, c). This is probably due to the effect of androgenic hormones that favour dominant or competitive behaviour in males.

Table 2: Dominance aggression's mean scores

Factor	Mean Scores	Duncan's group
FCI groups		
8	1.98	A
9	1.78	A
3	1.53	B
2	1.49	B
6	1.36	B
Mixed	1.33	B
1	1.31	B
5	1.1	B
7	0.33	C
4	0.33	C
10	0	C
Pure	1.53	B
Dog's sex		
Male	2.03	A
Female	0.97	B
Dog's size		
Small	1.92	A
Medium	1.72	A
Large	1.16	B
Dog's age		
5-7 years	2.04	A
>7 years	1.4	B
3-4 years	1.27	B
<3 years	1.18	B
Obedience training		
Yes	4.18	A
No	1.22	B
The person who trains the dog		
Owner	1.17	A
No owner	2.42	B
How spoiled the dog is		
5	4.45	A
4	3.56	B
3	2.96	C
2	1.5	D
0-1	0.87	E
Type of punishment used		
Only verbal	3.37	A
No punishment	2.81	A
Physical	0.97	B
Owner's age		
<30 years	1.62	A
30-65 years	1.47	B
>65 years	1.02	B
The time the owner spends walking the dog		
Nothing	2.98	A
0-30 min	2.25	B
30-60 min	1.29	C
60-120 min	1.09	C
>120 min	0.22	D
The total time the owner spends with the dog		
0-30 min	2.58	A
30-60 min	1.63	B
60-120 min	1.25	C
>120 min	0.51	D

Crowell-Davis (1991) states that dominance aggression is more common in purebreds but our results show that there are no significant differences between pure and mixed breeds. Logically, the genes of mixed-breed dogs include a combination of the parents genetic features. Hence, some mixed-breed dogs will have a higher tendency to develop dominance aggression owing to the parents genetic attributes. In a large sample of mixed-

breed dogs, including many different sizes and crossbreeds, the logical outcome would be for the dominance aggression average to be statistically equal to the average of purebreds. This is supported by our results (Table 2).

Our results confirm that English Cocker Spaniels with a single colour coat are more aggressive than particolour dogs (Podberscek and Serpell, 1997a, b; Pérez-Guisado *et al*., 2006) and more aggressive behaviour is displayed, in decreasing order, by blonde, black and finally particolour coated dogs (Podberscek and Serpell, 1996; Pérez-Guisado *et al*., 2006, 2008 a, c). The scores are 3.17, 2.14 and 1.41, respectively.

Guy *et al*. (2001a, b) state that small dogs tend to have more aggression problems towards people than bigger dogs. The results of this study support this statement, since it found an inversely proportional relationship between dog size and dominance aggression. Dogs in the small dogs group display the highest levels of dominance aggression followed by medium-sized and finally large dogs group (Table 2). This inversely proportional relationship is probably due to the positive relationship found between dog size and the following factors: not spoiling the dog; the use of obedience training; the use of physical punishment and the time spent generally with the dog and taking it for walks. Small dogs are the most spoiled, the least trained and the least physically punished. They are also taken for the fewest/shortest walks and have the least time dedicated to them.

Age plays an important role in canine aggression problems, since these problems usually begin before the dog is one year old (Guy *et al*., 2001a). Nevertheless, it usually increases between the first and third year (Borchelt and Voith, 1982). Even though dominance aggression begins at an early age, this problem does not usually start to worry the owner until the dog is between 6 and 24 months old (Cameron, 1997). Dominance aggression problems are first diagnosed in males between 12 and 36 months and in females between 2 and 36 months (Overall and Love, 2001). Our results complete this picture: dominance aggression increases progressively, reaching its maximum level between the ages of 5 and 7. After the age of 7, it begins to decrease with age (Table 2).

Our results (Table 2) confirm that obedience training is very important in controlling the incidence of dominance aggression (Jagoe and Serpell, 1996; Pérez-Guisado *et al*., 2008 b). This study also confirms that there is a positive relationship between dog size and obedience training: larger dogs are more likely to receive training than small dogs (Kobelt *et al*., 2003). These findings contradict those of Voith *et al*. (1992), who state that there is no correlation between obedience training and dominance aggression. It can also be suggested, that the person who trains the dog is also an important factor (Table 2): When the owner is in charge of obedience training, the dog displays lower levels of dominance aggression than if it is trained by someone else. This could be because the dog identifies the person who carries out obedience training as the dominant member of the family and it accepts a subordinate position in the relationship.

Having an anthropomorphic attitude towards the dog, spoiling it and treating it like a person, can cause behavioural problems such as dominance aggression (O'Farrell, 1997; Pérez-Guisado *et al*., 2008 b). For example, Guy *et al*. (2001b) found an association between whether the dog slept on someone's bed in the first 2 months of ownership and dominance aggression. Jagoe and Serpell (1996) discovered a link between the dog sleeping near the owner and an increased incidence of competition aggression. Our results support these authors statements (Table 2) but differ from the findings of Voith *et al*. (1992), who state that there is no link between spoiling the dog and dominance aggression.

Dogs that are disciplined only verbally have more behavioural problems such as separation anxiety (Takeuchi *et al*., 2001). Moreover, a lack of authority is associated with dominance aggression (Grognet and Parker, 1992; Pérez-Guisado *et al*., 2008b). Our results show that dogs that are punished only verbally have the highest dominance aggression average. Dogs that are physically punished, however, have the lowest dominance aggression average (Table 2). This means that physical punishment could be the most effective way of avoiding dominance aggression. Solarz (1970) states that physical punishment is the best way of restoring the owner's dominance over the dog. They however, would not advise the use of physical punishment with dominantly aggressive dogs (Crowell-Davis, 1991; Overall, 1999). Our results show that it is even less effective to punish the dog only verbally than not to punish the dog at all (Table 2). This might be due to the fact that many dog owners are not as hard as they should be when they punish their dogs verbally, that physical punishment is less ambiguous than verbal reprimand or maybe using only verbal reprimand is linked with anthropomorphic attitudes towards the dog. The dog realises that its bad behaviour does not lead to negative consequences, but that it does serve to attract its owner's attention. Thus, the owner is actually reinforcing the dog's bad behaviour. Dogs and wolves resolve their conflicts using force when warning signals are not enough and this is how the dominant dog/wolf is

established in the pack. For that reason and bearing in mind the results of our study, it is clearly a mistake to treat a dog as a person and not to use physical punishment when necessary, as a way of establishing dominance over a dog. Nevertheless, it must be noted that although, this method could be a way of establishing or restoring dominance over puppies or small dogs, it could be dangerous if attempted with physically powerful dogs.

Podberscek and Serpell (1997a) found a relationship between low levels of dominance aggression and owners over the age of 65, owners that spend more time with their dog and owners that spend more time walking their dog. Our results confirm these statements (Table 2) and that dogs that belong to owners under the age of 30 have the highest dominance aggression average. We also found an inverse relationship between the amount of time, the owner spends with the dog in general including taking it for walks and dominance aggression (Table 2). We believe that all this is due to the fact that old people is more responsible and have more leisure time than young people and when the owner spends leisure time with the dog, he is reinforcing their relationship. If the dog understands that all enjoyable activities in this relationship depend on the permission of the owner, it will accept a subordinate position.

CONCLUSION

- Although, some authors consider possession and dominance aggression as different forms of aggression, possession aggression is the first manifestation of dominance aggression and not a different form of aggression
- The greatest influence on dominance aggression in dogs depends on modifiable factors connected to the owner (environmental factors): Obedience training, how spoiled the dog is, the type of punishment used with the dog, the time the owner spends walking the dog and the total time the owner spends with the dog. For that reason owners are the main responsible for this undesirable dog behaviour

ACKNOWLEDGEMENT

This resaerch was supported by research grant from the Ministry of Education and Science of Spain. We are grateful to all the owners dog who responded to the survey unselfishly.

REFERENCES

Beaver, B.V., 1983. Clinical classification of canine aggression. Applied Anim. Ethol., 10: 35-43.

Borchelt, P. and V. Voith, 1982. Classification of animal behavioural problems. Vet. Clin. North Am. Small. Anim. Pract., 12: 571-586.

Borchelt, P., 1983. Aggressive behavior of dogs kept as companion animals: Classification and influence of sex, reproductive status and breed. Applied Anim. Ethol., 10: 45-61.

Cameron, D.B., 1997. Canine dominance-associated aggression: Concepts, incidence and treatment in a private behavior practice. Applied Anim. Behav. Sci., 52: 265-274.

Crowell-Davis, S.L., 1991. Identifying and correcting human-directed dominance aggression of dogs. Vet. Med., 86: 990-998.

Dodman, N.H., R. Donnelly, L. Shuster, P. Mertens, W. Rand and K. Miczek, 1996. Use of fluoxetine to treat dominance aggressive in dogs. J. Am. Vet. Med. Assoc., 209: 1585-1587. http://www.ncbi.nlm.nih.gov/pubmed/8899022.

Grognet, J. and T. Parker, 1992. Further diagnosis and treatment of canine dominance aggression. Can. Vet. J., 33: 409-410. http://www.ncbi.nlm.nih.gov/pubmed/17424030. http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=1481273&blobtype=pdf.

Guy, N.C., U.A. Luescher, S.E. Dohoo, E. Spangler, J.B. Miller, I.R. Dohoo, L.A. Bate, 2001a. A case series of biting dogs: Characteristics of the dogs, their behaviour and their victims. Applied Anim. Behav. Sci., 74: 43-57.

Guy, N.C., U.A. Luescher, S.E. Dohoo, E. Spangler, J.B. Miller, I.R. Dohoo, L.A. Bate, 2001b. Risk factors for dog bites to owners in a general veterinary caseload. Applied Anim. Behav. Sci., 74: 29-42.

Jagoe, A. and J. Serpell, 1996. Owner characteristics and interactions and the prevalence of canine behaviour problems. Applied Anim. Behav. Sci., 47: 31-42.

Kobelt, A.J., P.H. Hemsworth, J.L. Barnett and G.J. Coleman, 2003. A survey of dog ownership in suburban Australia-conditions and behaviour problems. Applied Anim. Behav. Sci., 82: 137-148.

Landsberg, G.M., W. Hunthausen and L. Ackerman, 1998. Handbook of Behavior P roblems of the Dog and Cat (Spanish Edn.). Acribia, Zaragoza, pp: 169-197. ISBN: 8420008486.

O'Farrell, V., 1997. Owner attitudes and dog behaviour problems. J. Small. Anim. Pract., 52: 205-213. DOI: 10.1111/j.1748-5827.1987.tb01327.x.

Overall, K.L., 1999. Understanding and treating canine dominance agression: An overview. Vet. Med., 94: 976-979.

Overall, K.L. and M. Love, 2001. Dog bites to humans-demography, epidemiology, injury and risk. J. Am. Vet. Med. Assoc., 218: 1923-1934. http://www.ncbi.nlm.nih.gov/pubmed/11417736.

Pérez-Guisado, J., R.L. Rodríguez, A.M. Serrano, 2006. Heritability of dominant-aggressive behaviour in English Cocker Spaniels. Applied Anim. Behav. Sci., 100: 219-227.

Pérez-Guisado, J., A.M. Serrano and R.L. Rodríguez, 2008a. Evaluation of the Campbell test and the influence of age, sex, breed and coat color on puppy behavioral responses. Can. J. Vet. Res., 72: 269-277. http://www.ncbi.nlm.nih.gov/pubmed/18505191. http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=2327247&blobtype=pdf.

Pérez-Guisado, J., A.M. Serrano and R.L. Rodríguez, 2008b. Perros peligrosos, la agresividad por dominancia (part 1): factores asociados dependientes del dueño. RECVET. 1010106. http://www.veterinaria.org/revistas/recvet/n010106/010106.pdf.

Pérez-Guisado, J., A.M. Serrano and R.L. Rodríguez, 2008c. Perros peligrosos, la agresividad por dominancia (parte 2): Factores asociados dependientes del perro. RECVET, 020106. http://www.veterinaria.org/revistas/recvet/n010106/020106.pdf.

Podberscek, A.L. and J.A. Serpell, 1996. The english cocker spaniel: Preliminary findings on aggressive behaviour. Applied Anim. Behav. Sci., 47: 75-89.

Podberscek, A.L. and J.A. Serpell, 1997a. Environmental influences on the expression of aggressive behaviour in English Cocker Spaniels. Applied Anim. Behav. Sci., 52: 215-227.

Podberscek, A.L. and J.A. Serpell, 1997b. Aggressive behaviour in English cocker spaniels and the personality of their owners. Vet. Rec., 141: 73-76. http://veterinaryrecord.bvapublications.com/cgi/content/abstract/141/3/73.

Polsky, R.H., 1996. Recognizing dominance aggression in dogs. Vet. Med., 91: 196-201. http://www.drpolsky.com/dominance.html.

Reisner, I.R., 2003. Differential diagnosis and management of human-directed aggression in dogs. Vet. Clin. North Am. Small. Anim. Pract., 33: 303-320. http://www.ncbi.nlm.nih.gov/pubmed/12701512.

SAS/STAT, 2000. User's guide, version 8. SAS Institute, Cary, NC. ISBN: 1580254942.

Solarz, A.K., 1970. Behavior. In: Andersen, A.C. (Ed.). The Beagle as an Experimental Dog. The Iowa State University Press, Ames, Iowa, pp: 453-468.

Takeuchi, Y., N. Ogata, J.A. Houpt and J.M. Scarlett, 2001. Differences in background and outcome of three behavior problems of dogs. Applied Anim. Behav. Sci., 70: 297-308.

Uchida, Y., N. Dodman, J. De Napoli and L. Aronson, 1997. Characterization and treatment of 20 canine aggression cases. J. Vet. Med. Sci., 59: 397-399. http://www.ncbi.nlm.nih.gov/pubmed/9192364. http://www.jstage.jst.go.jp/article/jvms/59/5/397/_pdf.

Voith, V.L., J.C. Wright and P.J. Danneman, 1992. Is there a relationship between canine behaviour problems and spoiling activities, anthropomorphism and obedience training? Applied Anim. Behav. Sci., 34: 263-272.

Wright, J.C., 1991. Canine aggression toward people. Bite scenarios and prevention. Vet. Clin. North. Am. Small. Anim. Pract., 21: 299-314. http://www.ncbi.nlm.nih.gov/pubmed/2053252.