Journal of Veterinary Behavior 10 (2015) 204–209

Contents lists available at ScienceDirect

Journal of Veterinary Behavior

journal homepage: www.journalvetbehavior.com

Research

Can bark counter collars and owner surveys help identify factors that relate to nuisance barking? A pilot study

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ARTICLE INFO

Article history:
Received 10 April 2014
Received in revised form
11 February 2015
Accepted 15 February 2015
Available online 21 February 2015

Keywords:
dog
nuisance barking
barking patterns
bark counter collar

ABSTRACT

Nuisance barking by the domestic dog refers to excessive or unreasonable barking which is considered annoying or inappropriate by the community. Such barking can be very problematic, with nuisance barking complaints comprising the majority of complaints received by Australian municipal councils, but also signaling a welfare issue with the dog. The aim of this exploratory study was to establish whether there is any relationship between potential predisposing factors and the barking behavior and whether such relationships can be extracted from owner surveys and barking patterns. This study involved 4 Australian municipal councils and used bark counter collars to record the barking behavior of 25 dogs, each reported as being a nuisance barker, over 7 consecutive days. In addition, an owner questionnaire was created to identify factors that may be associated with nuisance barking. Our study shows that barking patterns can be documented using bark counter collars. Four dogs displayed barking patterns which suggested that a specific, regularly occurring stimulus was associated with the nuisance barking. A Spearman rank-order correlation test showed a negative correlation between barking frequency and the amount of obedience training received by the dog and a positive correlation with the number of dogs in neighboring houses. This information may be used by councils and veterinary behaviorists when addressing nuisance barking and provides indications where further research might be productively focused.

Introduction

Worldwide, nuisance barking is reported as a major canine behavioral problem, affecting approximately 1 in 3 dogs (Adams and Clark, 1989; Campbell, 1986; Kobelt et al., 2003). Nuisance barking is the single most common complaint that local councils receive in Australia (Righetti, 2005). It frequently generates angst and animosity between neighbors and owners and is a common reason for dogs to be relinquished to animal shelters (Wells and Hepper, 2000; Marston and Bennett, 2003; Marston et al., 2005) where, in extreme cases, dogs may be euthanized (Marston and Bennett, 2003).

Dogs bark for a variety of reasons, whether it is territorial guarding, excitement, boredom, fear, pain, or distress (Seksel, 2004; Yin and McCowan, 2004; Pongrácz et al., 2010) and this might be a reflection of the animal's internal conflicting motivations as typically encountered in mobbing behavior (Lord et al., 2009). A range of factors influences the onset, duration, and severity of barking. For example, the age of the dog is thought to have an influence on nuisance barking behavior (Campbell, 1986; Wells and Hepper, 2000; Cross et al., 2009; Khoshnegah et al., 2011). Owner experience is also believed to have an effect on the occurrence of various problematic canine behaviors, including nuisance barking (Jagoe and Serpell, 1996; Kobelt et al., 2003; Bennett and Rohlf, 2007). Furthermore, the amount time that the dog is left home alone, the amount of exercise received by the dog, and the amount of obedience training received by the dog are all considered to influence the quality of the owner-dog bond, as well as the occurrence of nuisance barking behavior (Clark and Boyer, 1993; Jagoe and Serpell, 1996; Clark et al., 1997; Marston and Bennett, 2003; Bennett and Rohlf, 2007; Kobelt et al., 2007; Rehn and Keeling, 2011; Flint et al., 2012). Although a number of studies have investigated some of the factors that may predispose dogs to nuisance barking, little attention has been paid to the possibility of a correlation between these factors and actual nuisance barking behavior. A better understanding of these relationships could enhance

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http://dx.doi.org/10.1016/j.jveb.2015.02.006
1558-7878/

Table 1
Breed, sex, desexed status and age of the 25 dogs used in this study

Dog number	Breed	Sex	Desexed	Age (years)
1	Mixed (Maltese × Shih Tzu)	M	Yes	10
2	Mixed (Maltese × Terrier)	M	Yes	13
3	Golden Retriever	F	Yes	8
4	Dalmatian	F	Yes	6
5	Mixed (~Kelpie)	M	Yes	7
6	Golden Retriever	F	Yes	5
7	Mixed (~Fox Terrier)	F	Yes	10
8	Golden Retriever	M	Yes	6
9	German Shepherd	M	Yes	2
10	Mixed (Staffordshire Bull Terrier × Kelpie)	F	No	1
11	Mixed (~German Shepherd)	F	No	1
12	Mixed (~German Shepherd)	M	Yes	7
13	Mixed (~Fox Terrier)	F	Yes	4
14	Mixed (~Staffordshire Bull Terrier)	M	Yes	3
15	German shepherd	M	Yes	2
16	Labrador Retriever	M	Yes	6
17	Mixed (~Border Collie)	F	Yes	1
18	Mixed (~Kelpie)	F	Yes	1
19	Staffordshire Bull Terrier	M	Yes	4
20	Pug	F	No	7
21	Shih Tzu	F	Yes	5
22	Samoyed	M	No	1
23	Samoyed	M	No	2
24	Mixed (~Shih Tzu)	M	Yes	9
25	Mixed (~Maltese)	M	Yes	8

~, resembling; F, female; M, male.

management and prevention strategies to address both the nuisance for humans and underlying welfare issues for the dog (Flannigan and Dodman, 2001; Bradshaw et al., 2002).

Because nuisance barking can result in prosecutions or fines (Murray, 2003), Animal Management Officers (AMOs) need to use reliable and accurate methods to investigate nuisance barking. The last decade has seen the development of bark counter collars that are beginning to be used by local councils to investigate nuisance barking complaints (Murray and Scriggins, 2005). Despite the fact that there is no official standard measure for what constitutes "normal" barking (Flint et al., 2012), these collars—despite their limitations—may be useful in distinguishing between "real" and "false" nuisance barking cases. After a nuisance barking complaint is lodged with animal management, the council must undertake an initial investigation to determine whether such a nuisance exists. This pilot study was conducted during the initial investigation of the complaint. At this stage, the dogs do not undergo any physical or behavioral examination. The aim of this pilot study was to identify correlations between nuisance barking behavior (barking frequency recorded by bark counter collars) and potential contributing factors (extracted from owner questionnaire responses).

Materials and methods

Participants

Four Australian municipal councils, located in suburban areas in large cities, that used bark counter collars as part of their routine investigations into nuisance barking complaints participated in this study: Knox City Council (Victoria), Logan City Council (Queensland), Maroondah City Council (Victoria), and Yarra Ranges Shire Council (Victoria). Residents in these municipalities, whose dogs had been the subject of a nuisance barking complaint, were recruited, resulting in a sample of 25 privately owned dogs of both sexes and of varying breeds (Table 1).

Bark counters

A bark counter collar was fitted to the dog in question by an AMO from the participant's council and was left to continuously record the number of barks per hour by the dog across a 7-day period. In households with >1 dog, all dogs were fitted with a bark counter collar. Two different types of bark counter collars were used: the Bark & Activity Counter (Premier Pet Products, Midlothian, Virginia) and the ABS Bark Counter (Animal Behaviour Systems, Hoppers Crossing, Victoria, Australia). Both devices are worn by the dog like a regular dog collar and rely on a microphone embedded in the device to detect barking frequency. Barking data are recorded on a microchip and can be downloaded to a computer.

Questionnaire

We constructed a questionnaire (Supplementary Material) that was completed by all participants. The questionnaire contained 36 questions divided into 4 sections: dog information, owner information, owner-dog relationship, and household and environment.

Data analysis

Barking patterns were identified through visual inspection of a line graph showing the barking behavior as a function of time for each dog across the sampled week. Quantitative data from the collars and the questionnaire were analyzed using the statistical software package IBM SPSS 21.0, with a significance level set at 0.05. Spearman rank-order correlations were used to determine the strength and significance of any relationship between barking (expressed as barks per week) and 6 potential contributing factors thought to influence nuisance barking behavior: (1) the age of the dog, (2) the number of hours that the dog was left home alone for the week, (3) the number of hours of obedience training ever received by the dog, (4) the number of minutes of exercise received by the dog for the week, (5) the number of dogs previously owned by the owner, and (6) the number of dogs in neighboring houses.

Results

Peak barking over the 7-day period varied from 10 barks per hour in 1 dog to almost 500 barks per hour in another. In approximately 64% of the cases, dogs were found to bark more in the absence of the owner than when the owner was present. Of the dogs in our sample, the majority (84%) were confined to the backyard in the owners' absence and 1 had access to the garden through a dog door. The barking plots for all 25 dogs sampled were suggestive of reactive barking, as indicated by the sporadic peaks in barking (Figure 1; see Supplementary Material for all barking plots), which in 4 cases appeared indicative as being a response to a recurring stimulus as they occurred at regular times on certain days. A representative barking plot demonstrating such a recurring-stimulus barking pattern is illustrated in panel A of Figure 1. In this particular case, the owners identified people (or other dogs or cats) passing the property on the street as the main reason for the barking, as was the case for more than half (64%) of the dogs in this sample. Of the dogs allegedly responding to passers-by, 48% were behind a see-through fence, whereas 52% were kept behind a non–see-through fence. One dog (dog 6 in the Supplementary Material) that barked mostly at night was—according to the owners—responding to possums (nocturnal marsupials) on the property. When dogs were kept together in the backyard, barking plots were almost identical for 1 pair of dogs (dogs 13 and 14 in the