

THE INFLUENCE OF LENGTH OF TIME IN A RESCUE SHELTER ON THE BEHAVIOUR OF KENNELLED DOGS

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Abstract

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Animal rescue shelters provide temporary housing for thousands of stray and abandoned dogs every year. Many of these animals fail to find new homes and are forced to spend long periods of time in kennels. This study examined the influence of the length of time spent in a rescue shelter (<1 month, 2–12 months, 1–5 years, >5 years) on the behaviour of 97 dogs. The dogs' position in their kennels (front, back), their activity (moving, standing, sitting, resting, sleeping), and their vocalisation (barking, quiet, other) were recorded over a 4 h period at 10 min intervals. The dogs' behaviour was significantly related to the length of time the animals had spent in the rescue shelter. Dogs housed in the shelter for over five years spent more of their time at the back of their kennels, more time resting, and less time barking than dogs housed in the shelter for shorter periods of time. The age of the dog could not account for the significant results found, suggesting that environmental factors were responsible for the change in the dogs' behaviour. The findings suggest that lengthy periods of time spent in a captive environment may encourage dogs to behave in a manner that is generally considered unattractive by potential buyers. This may decrease the chances of such dogs being adopted, resulting in longer periods of time spent in the kennel environment and the possible development of further undesirable behaviours.

Keywords: *animal welfare, behaviour, canines, captivity, dogs, rescue shelters*

Introduction

Thousands of animals are held in captive conditions world-wide, ranging from exotic species held in zoos and safari parks to domestic species such as dogs and cats which may find themselves in the care of their local animal rescue shelter. The effect of captivity on the behaviour and welfare of animals has received much attention since the original studies by Hediger (1950, 1955). It is now known that keeping animals in small, uninteresting environments can induce abnormal and aberrant behaviours (Dittus 1979; Fox 1968; Lorenz & Mason 1971; Meyer-Holzapfel 1968; Morris 1964; Poole 1988; Redshaw & Mallinson 1991; Stevenson 1983; Wemelsfelder 1984), and many attempts to improve well-being by enriching the environment through the provision of extra stimulation have been undertaken (eg Beaver 1989; Bloomstrand *et al* 1986; Hetts *et al* 1992; Hubrecht 1993, 1995; Markowitz 1982; Wells 1996; Wells & Hepper 1992, 2000a).

Every year, thousands of stray and abandoned dogs are provided with temporary housing in rescue shelters. A large number of sheltered dogs fail to find new homes and are forced to spend long periods of time — sometimes several years — in kennels. However well these

dogs are cared for, it cannot be ignored that being in such a situation is stressful, and the time spent in the shelter may change the animals' behaviour. This may in turn influence potential buyers' perceptions of the dogs' desirability and the animals' chances of subsequent adoption (Wells 1996; Wells & Hepper 2000b).

To date, the influence of length of time in captivity on the behaviour and welfare of dogs housed in rescue shelters has been largely overlooked. Wells and Hepper (1992) explored the behaviour of dogs over a period of six days in a rescue shelter and reported that there was little to suggest that the welfare of dogs is compromised by such a relatively short period of time in captivity. The authors stressed, however, the potential for reduced welfare in dogs housed for lengthy periods of time in captivity and highlighted the need for research into the effects of time in captivity on the behaviour of dogs held in kennel environments.

This study examines the influence of length of time spent in a rescue shelter on the behaviour of kennelled dogs in order to determine whether the animals' behaviour is related to the amount of time they have spent in a captive environment. The influence of the animals' age on their behaviour is also explored in order to determine whether any changes in behaviour are attributable to environmental factors or to the natural process of maturation.

Methods

Study site

The National Canine Defence League (NCDL) Rehoming Centre in Evesham (Worcester, UK) was used as the study site. The shelter is capable of housing 130 dogs at any one time. Dogs housed in this centre are generally housed singly or in pairs, either in one of four circular-style kennels or in one of four line-block-style kennels. The dogs' enclosures are cleaned thoroughly every morning and as required throughout the course of the day. The animals are fed once per day in the afternoon.

Dogs housed in the shelter's circular-style kennels were used in the study. Each of the dogs' kennels comprised a wire-mesh front, a door at the back of the pen to allow staff access to the enclosure, and solid concrete floor and walls. The kennel was divided into two sections, referred to hereafter as 'front' and 'back' (see Figure 1). From the front of their kennels, the dogs could view conspecifics housed in the opposite kennel blocks and humans as they walked past the front of the animals' pens. From the rear of their kennels, the dogs could see other dogs that also happened to be at the back of their kennels, and shelter staff. Whenever they were at the back of their kennels, the dogs were largely hidden from the view of the public.

Subjects

Table 1 presents information regarding the number of dogs used as subjects according to the length of time the animals had been residing in the rescue shelter (ie <1 month, 2–12 months, 1–5 years, >5 years) and the individuals' age (<6 months [puppy], 7–12 months [juvenile], >1 year [adult]). The majority of the dogs were cross-breeds, thus preventing any valid analysis of breed differences. All of the subjects were housed in pairs, and were healthy at the time of the study.

Procedure

The behaviour of each dog was recorded over a 4 h period using a scan sampling technique (eg Martin & Bateson 1986). At 10 min intervals the experimenter (LG) approached the front of each subject's kennel and recorded the dog's behaviour as soon as she saw the animal.

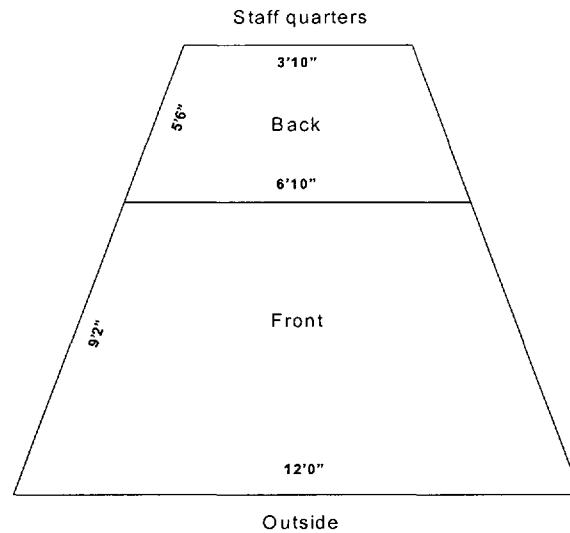


Figure 1 The layout of a dog's kennel in the rescue shelter.

Table 1 The number of dogs that participated in the study according to the animals' age and length of time spent in the rescue shelter.

Dog age	Length of time in rescue shelter				Total
	<1 month	2–12 months	1–5 years	>5 years	
Puppy	7	9	0	0	16
Juvenile	7	5	11	0	23
Adult	6	11	18	23	58
Total	20	25	29	23	97

Three separate aspects of behaviour (all known to influence public perceptions of dog desirability [Wells 1996]) were recorded at each observation, namely:

1. *Position in the kennel*: front, back (see Figure 1).
2. *Activity*: standing (dog supported upright with all four legs); sitting (dog supported by two extended front legs and two flexed back legs); resting (dog reclining in ventral or lateral position, eyes open); sleeping (dog reclining in ventral or lateral position, eyes closed); moving (dog walking, running or trotting about the cage); socialising (dog interacting with its kennel-mate).
3. *Vocalisation*: barking; quiet (no vocalisation); other (includes whining, growling, whimpering).

Each dog was studied for a period of 4 h every 10 min, providing 24 observations of the dog's position in the cage, activity, and vocalisation. Each behaviour was treated separately. For each behaviour, the number of times the dog was observed in each category (ie for position in the kennel: front, back; for activity: standing, sitting, resting, sleeping, moving, socialising; and, for vocalisation: barking, quiet, other) was summed across the 4 h observation period.

Data analysis

Three mixed-design ANOVAs (eg Howell 1992) were conducted for the between-subjects factor of length of time in the rescue shelter (<1 month, 2–12 months, 1–5 years, >5 years)

and the within-subjects factor of dog behaviour (eg position in the kennel [front, back]) in order to determine the influence of the length of time spent in the rescue centre on the dogs' position in the kennel, activity, and vocalisation. None of the dogs were seen socialising with their kennel-mates; socialisation was thus excluded from the activity category and from all subsequent analyses.

Results

The results of the analyses are presented separately below. Only significant findings are reported.

The effect of length of time in a rescue shelter on the dogs' behaviour

1. *Position in kennel*: The dogs' position in their kennels was significantly related to the length of time the animals had been residing in the shelter ($F_{3,93} = 4.16$, $P < 0.05$). Dogs housed in the shelter for over five years spent more time at the back of their kennels, and less time at the front, than dogs housed there for shorter periods of time ($P < 0.05$, simple effects test; see Table 2).

2. *Activity*: The dogs' activity was significantly related to the length of time the animals had been residing in the rescue shelter ($F_{12,372} = 2.38$, $P < 0.05$). Dogs housed in the shelter for longer than five years spent more of their time resting and sitting, and less of their time standing, than dogs housed there for shorter periods of time ($P < 0.05$, simple effects test; see Table 3).

3. *Vocalisation*: The length of time spent in the rescue shelter significantly influenced the dogs' vocalisation ($F_{6,186} = 6.41$, $P < 0.001$). Dogs housed in the shelter for less than a month spent more of their time barking, and less of their time quiet, than dogs housed in the shelter for longer periods of time ($P < 0.05$, simple effects test; see Table 4).

Table 2 The mean (\pm SE) amount of time (number of observations out of a maximum of 24) that dogs of all ages, and adult dogs only, spent in each position of their kennels according to the animals' length of time spent in the rescue shelter.

Position in kennel	Length of time in rescue shelter			
	<1 month	2–12 months	1–5 years	>5 years
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
<i>Front</i>				
Dogs of all ages	14.90 (1.92)	12.00 (1.69)	10.72 (1.76)	6.17 (1.22)
Adult dogs only	14.33 (3.36)	14.00 (2.59)	8.89 (1.86)	6.17 (1.22)
<i>Back</i>				
Dogs of all ages	9.10 (1.92)	12.00 (1.69)	13.28 (1.70)	17.83 (1.44)
Adult dogs only	9.67 (3.36)	10.00 (2.59)	15.11 (1.86)	17.83 (1.22)

The effect of maturation on the dogs' behaviour

With increased time in captivity comes a corresponding increase in an animal's age. To determine whether any of the changes in behaviour shown by the dogs over the course of their time in captivity reflected a genuine response to the environment or merely a natural process of maturation, the analysis conducted previously was repeated for dogs of a similar age which had been residing in captivity for variable lengths of time. Specifically, a mixed-design ANOVA was carried out for adult dogs (the only age group of dogs that could have resided in captivity for the four categories of length of time used in the study; see Table 1) for the between-subjects factor of length of time in rescue shelter (<1 month, 2–12 months,

1–5 years, >5 years) and the within-subjects factor of dog behaviour (eg position in the kennel [front, back]).

1. *Position in kennel*: When including adult dogs only in the analysis, there was still a significant ($F_{3,54} = 3.34$, $P < 0.05$) effect of length of time in the shelter on the animals' position in their kennels (see Table 2).

2. *Activity*: When including adult dogs only in the analysis, there was still a significant ($F_{12,216} = 3.24$, $P < 0.001$) effect of length of time in the shelter on the activity of the dogs (see Table 3).

3. *Vocalisation*: When including adult dogs only in the analysis, there was still a significant ($F_{6,108} = 8.73$, $P < 0.001$) effect of length of time in the shelter on the animals' vocalisation (see Table 4).

Table 3 The mean (\pm SE) amount of time (number of observations out of a maximum of 24) that dogs of all ages, and adult dogs only, spent in each activity according to the animals' length of time spent in the rescue shelter.

Activity	Length of time in rescue shelter			
	<1 month	2–12 months	1–5 years	>5 years
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
<i>Standing</i>				
Dogs of all ages	12.92 (1.68)	11.10 (1.65)	10.14 (1.55)	6.09 (0.92)
Adult dogs only	15.64 (2.22)	12.00 (4.13)	8.00 (1.58)	6.09 (0.92)
<i>Resting</i>				
Dogs of all ages	9.80 (1.63)	11.00 (1.78)	12.76 (1.55)	14.26 (1.13)
Adult dogs only	9.67 (3.36)	7.82 (1.99)	14.89 (1.58)	14.26 (1.13)
<i>Sitting</i>				
Dogs of all ages	1.00 (0.49)	0.64 (0.50)	0.97 (0.62)	2.35 (1.06)
Adult dogs only	0 (0)	0 (0)	0.89 (0.89)	2.35 (1.06)
<i>Moving</i>				
Dogs of all ages	0.70 (0.70)	0.48 (0.35)	0.14 (0.14)	0.61 (0.37)
Adult dogs only	2.33 (2.33)	0.36 (0.36)	0.22 (0.22)	0.61 (0.37)
<i>Sleeping</i>				
Dogs of all ages	0 (0)	0.08 (0.08)	0 (0)	0.26 (0.14)
Adult dogs only	0 (0)	0 (0)	0 (0)	0.26 (0.14)

Table 4 The mean (\pm SE) amount of time (number of observations out of a maximum of 24) that dogs of all ages, and adult dogs only, spent in each vocalisation according to the animals' length of time spent in the rescue shelter.

Type of vocalisation	Length of time in rescue shelter			
	<1 month	2–12 months	1–5 years	>5 years
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
<i>Quiet</i>				
Dogs of all ages	16.30 (1.81)	20.24 (0.94)	21.38 (0.76)	22.57 (0.76)
Adult dogs only	12.33 (4.01)	19.82 (1.25)	21.73 (0.64)	22.57 (0.76)
<i>Barking</i>				
Dogs of all ages	7.50 (1.85)	3.04 (0.96)	2.55 (0.77)	1.00 (0.70)
Adult dogs only	11.00 (4.31)	2.91 (1.30)	2.02 (0.63)	1.00 (0.70)
<i>Other</i>				
Dogs of all ages	0.20 (0.20)	0.72 (0.38)	0.07 (0.07)	0.43 (0.28)
Adult dogs only	0.67 (0.67)	1.27 (0.78)	0.24 (0.16)	0.43 (0.28)

Discussion

The findings from the present study indicate that the behaviour of kennelled dogs is significantly influenced by the length of time spent in the shelter environment.

The amount of time that dogs spent in each position of their kennels differed according to the length of time the animals had been residing in the rescue shelter. Dogs that had been in the shelter for longer than five years spent significantly more of their time at the rear of their enclosure than dogs that had been in the shelter for shorter periods of time. This finding suggests a change in the amount of interest that dogs have in their external environment over time. In the early stages of captivity, dogs appear to be interested in the environment outside their enclosure, perhaps eager to interact with any passers-by or to view the dogs housed in the opposite kennel blocks. As their time in captivity increases, however, dogs seem to lose interest in their external environment, perhaps having learned that the presence of a human at the front of the kennel does not always result in an interaction.

Although this change in the dogs' position in their kennels over time is not a particularly negative one in itself, it may have indirect consequences for the rehoming of dogs that have been living in a shelter environment for lengthy periods of time. Previous research indicates that dogs that spend their time at the rear of their enclosures are more difficult for visitors to view and are perceived by the public to be 'unfriendly'. These dogs, as a consequence, are frequently overlooked for adoption (Wells 1996; Wells & Hepper 1992, 2000a). Because dogs tend to spend more of their time at the rear of their kennels as their time in captivity increases, dogs that have lived in the shelter for lengthy periods may be more difficult to rehome than animals that have lived there for shorter periods. Many rescue shelters do indeed report that this is the case. Enhancing the external environment of sheltered dogs so that it remains interesting to the animals, thereby encouraging them to the front of their pens, or altering the kennel design so that dogs can be more easily viewed at the rear of their enclosures, may improve the rehoming opportunities of dogs that have been in captivity for long periods.

The dogs' activity was related to the length of time the animals had spent in the rescue shelter. Dogs in the early stages of captivity (ie under six months) exhibited relatively inquisitive behaviour, spending much of their time standing alert. Those dogs that had been in the shelter for a longer period of time, however — particularly over five years — showed more sedentary behaviour, spending much of their time resting. At first glance, this finding may be considered a positive one, perhaps reflecting the development of familiarisation with daily routines, or an acceptance of their captive situation. However, long periods of time spent resting can indicate apathy or boredom (eg Broom & Johnston 1993). The increased time that dogs spend resting may also reflect a state of 'learned helplessness' (eg Seligman 1975) — a failure to cope with the lack of control over one's environment. Moreover, potential buyers consider sedentary behaviour in sheltered dogs to be undesirable, having a preference instead for animals that are active (Wells 1996).

The dogs' vocalisation was also found to be related to the length of time the animals had spent in the rescue shelter. Dogs that had been in the shelter for less than one month spent more of their time barking than animals that had been in the kennels for a longer period. The higher frequency of barking seen in the early stages of captivity is understandable, and is likely to reflect the dogs' unfamiliarity with their new environment. Rescue shelters are highly stimulating environments. Noise from staff as they undertake their daily husbandry routines, intermittent interruptions from visitors as they tour the kennels and the sight of other dogs can all be a source of stimulation for captive animals. As the animals become

more accustomed to the shelter environment, however, they are likely to become calmer and spend less of their time barking.

It must be borne in mind that with increased time in captivity comes a corresponding increase in an animal's age. One must therefore question whether the change in behaviour shown by dogs over the course of their time in captivity reflects a genuine response to the environment, or whether it simply reflects a natural process of maturation. The findings from the present study suggest that the former is the more likely explanation. Adult dogs, for instance, behave in a similar manner to younger animals that have been living in the kennels for the same length of time.

Although it was not the purpose of this particular study, it would be interesting to explore the influence of length of time in captivity on the physical health status of sheltered dogs. Research suggests that the physiological well-being of laboratory dogs is not jeopardised by relatively long periods of time (16 months) in captivity (Newton 1972). Whether or not long-term confinement has an impact upon the physiological health of sheltered dogs remains largely unknown and warrants further investigation.

Animal welfare implications

Overall, the findings suggest that the length of time spent by dogs in a rescue shelter influences their behaviour. There is nothing to suggest from the present study that the welfare of the dogs is directly jeopardised by lengthy periods in captivity. None of the dogs, for instance, were seen to exhibit abnormal behaviours typically associated with reduced well-being, such as stereotypies or self-mutilations (eg Fox 1965; Luescher *et al* 1991; Solarz 1970; Thompson *et al* 1956). This is a positive finding. Nonetheless, lengthy periods of time in the kennels did result in the development of behaviours that are generally considered unattractive by potential buyers, and this may indirectly influence the dogs' welfare, decreasing the animals' chances of being adopted.

The question remains as to how rescue shelters can improve the rehoming chances of those dogs that have been residing in their care for several years. Many rescue shelters battle with this dilemma on a regular basis. One solution may lie in enriching the environment of the animals in such a way as to stimulate the animals and encourage them to behave in a more publicly acceptable manner. Recent research indicates that modifying the cage environment of sheltered dogs by adding a toy or a bed to the front of the cage can have positive implications for a sheltered dog's chances of being rehomed (Wells & Hepper 2000a). Increasing the complexity of the cage environment appears to stimulate interest from passers-by and also encourages dogs to behave in more publicly acceptable manners, for example by spending more of their time active and at the front of their enclosures.

Moving dogs to those kennels that are seen by visitors at the beginning of their tour of the rescue shelter may be another way to improve the rehoming success of the animals that have been in captivity for long periods. Wells and Hepper (2001) discovered that visitors to a rescue shelter in Northern Ireland spent more time looking at those dogs housed in the first 10 kennels to which they were exposed on their tour of the shelter, compared to those dogs housed elsewhere. Moreover, dogs were more likely to be rehomed from the shelter if they were housed in the first 10 kennels that visitors came upon.

Rotating the dogs to different kennels every few days may also help to improve their chances of being rehomed. Novelty generally encourages exploration in animals. Although the majority of kennels in any rescue shelter tend to be quite similar in structure, each will offer slightly different odours, views, and possibly even kennel-mates. This novelty may

result in greater exploration, more active behaviour patterns and a subsequent increase in the likelihood of adoption. Further research is required to determine the specific effects of kennel rotation on the behaviour of sheltered dogs and its implications for animal rehoming.

Poole (1992) has stated that any captive animal must be allowed to fulfil its biological needs. The dog is a social animal that needs regular contact with both conspecifics and humans (eg Fox 1965). It is also an opportunist, spending much of its time active, and requires a highly stimulating environment to explore (Morris 1964). In addition to enriching the kennel environment of sheltered dogs, the provision of regular walks, training, grooming and group play sessions may provide some of the social, mental and physical stimulation that dogs require.

Finally, one must consider the nature of information that is provided to visitors regarding the behaviour of dogs housed in rescue shelters. Dogs behave in a very different manner in captive, compared to non-captive, environments. Visitors need to be made aware that the dog behaviours they are exposed to in the shelter environment are not typical of those generally seen in the home environment. It is for precisely this reason that many rescue shelters now offer visitors the opportunity to interact with dogs outside the kennels. This type of one-to-one canine-human interaction allows visitors to experience more typical dog behaviours and may be particularly beneficial for those animals that display relatively 'apathetic' behaviours in the kennel environment.

Many rescue organisations are now paying more attention to the kennel environment of sheltered dogs and to the important relationship between kennel design, dog behaviour and public perceptions of dog desirability. The NCDL, for instance, in addition to enriching the environment of their dogs through the provision of toys and kennel furniture, has been actively involved in recent years in commissioning research to explore the most appropriate way to house sheltered dogs. The ongoing research in this area will hopefully ensure that developments continue to be made in our understanding of how to ideally house sheltered dogs in order to promote their welfare whilst in captivity and how to improve their chances of being rehomed.

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