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The influence of toys on the behaviour and welfare of kennelled dogs

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Abstract

This study explored the influence of five toys (squeaky ball, non-squeaky ball, Nylabone chew, tug rope and Boomer ball) on the behaviour of 32 adult dogs housed in a rescue shelter. The dogs were exposed to each toy separately for six days, with an intervening period of one day between toys. The dogs' location in their kennels (front or back), activity (moving, standing, sitting or resting) and vocalisation (barking, quiet or other) were recorded over 4 h at 10 min intervals on Days 1, 3 and 5 during a control condition (no toy present) and during five experimental (toy) conditions. Whether or not the dogs were observed playing with the toys during the experimental conditions was also recorded. The dogs spent relatively little (<8%) of the overall observation time playing with the toys. The toys elicited varying degrees of interest, with dogs showing a preference for the Nylabone chew over the other toys. The dogs' interest in the toys waned over time, but the speed of habituation to the Nylabone chew was slower than to any of the other toys. The dogs' activity was significantly related to toy condition: dogs spent more time moving and less time standing during the Nylabone chew, squeaky ball and non-squeaky ball conditions than during any of the other conditions. It is suggested that the welfare of kennelled dogs may be slightly enhanced by the addition of suitable toys to their kennels. It is advised, however, that toys are rotated to encourage exploration and reduce habituation. The provision of other forms of environmental enrichment is also recommended.

Keywords: *animal welfare, behaviour, dogs, enrichment, housing conditions, rescue shelters, toys*

Introduction

The effects of captivity on the behaviour and welfare of animals has received much attention since the early studies of Hediger (1950, 1955). Today it is well known that keeping animals in small, uninteresting environments can induce abnormal and aberrant behaviour (for reviews see Broom & Johnson 1993; Shepherdson *et al* 1998), and many attempts to improve animal well-being by enriching the environment through the provision of extra stimulation have been undertaken (eg Hetts *et al* 1992; Ladd *et al* 1992; Wells & Hepper 1992, 2000; Hubrecht 1993, 1995; Larsson *et al* 2002; Renner & Lussier 2002; Wells *et al* 2002b).

Toys are one of the most frequently employed forms of inanimate enrichment and are routinely provided both to domestic and exotic captive animals in a bid to encourage play and reduce boredom. Despite the widely held belief that toys are a source of fun and a panacea for psychological disturbance, research exploring the effects of toys on the welfare of captive animals provides contradictory results. Thus, whilst some studies suggest that toys can be advantageous for animal well-being, helping to promote exploration, increase levels of activity and reduce abnormal behaviours, others indicate that toys exert absolutely no effect upon the behaviour or welfare of captive animals (for reviews see Newberry 1995; Shepherdson *et al* 1998).

Recently, the effect of toys on the behaviour and welfare of dogs has been subject to exploration. Laboratory-housed dogs have been found to show much interest in toys, particularly toys that are novel in nature, can be chewed (eg Rawhide, Gumabone) or generate noise (eg chains) (DeLuca & Kranda 1992; Hubrecht 1993, 1995). Somewhat surprisingly, dogs housed in rescue shelters do not appear to benefit from toys to the same extent as do laboratory-housed dogs. Wells and Hepper (1992, 2000) discovered that dogs in rescue shelters largely overlooked the introduction of a Kong ball or a Gumabone chew to their kennel environment, and suggested that perhaps these particular stimuli were not appealing to them. The fact that the Gumabone chew was suspended from the front of the dogs' kennels, and thus could not be picked up, may also have limited the animals' enthusiasm. Whether different types of toy presented in a less restricted manner would arouse more interest from rescue shelter dogs remains unknown.

The following paper examines the effects of novel toys on the behaviour and welfare of dogs housed in a rescue shelter. Many dogs are held in rescue shelters for lengthy periods of

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time (Wells *et al* 2002a), thus, finding a suitable means of enriching their environment is of utmost importance.

Methods

Study site

The Dogs Trust Re-homing Centre in Ballymena, Northern Ireland, UK was employed as the study site. At the time of the study the centre was capable of housing 80 dogs at any one time. Dogs were housed singly or in pairs, in six rows of line-block style kennels, each offering the animals 6 m^2 of floor space. Each kennel had a wire-mesh door at the front, and the walls and floor were concrete. Kennels faced each other and were separated by a concrete corridor along which visitors and staff could walk. Each kennel was divided into two sections, referred to hereafter as 'front' and 'back'. From the front sections of the kennels (1.82 m wide × 2.43 m long × 2.13 m high), dogs could view conspecifics housed in opposite line blocks and humans as they walked along the separating corridor, whereas in the secluded back sections (1.82 m wide × 1.22 m long × 2.13 m high) they were largely hidden from the view of the public, staff and other dogs.

The dogs' enclosures were cleaned thoroughly every morning and as necessary throughout the course of the day. The animals were fed once a day in the afternoon.

Subjects

Fifteen neutered male dogs and 17 spayed females, all randomly chosen, were used as subjects. The majority of the dogs were crossbreeds, thus preventing any valid analysis of breed differences. All of the dogs were healthy and were between 2–6 years of age (mean ± standard error = 4.31 ± 0.23 years). This sample was representative of dogs admitted to this particular Dogs Trust centre. All of the subjects were housed singly in line with the shelter's policy and had been living at the site for between 6–8 months.

Toy conditions

Six conditions: one control (ie no toy present in the dogs' environment) and five experimental (toy present), were implemented in the study. Five commercially available dog toys were employed in the experimental conditions:

1. Squeaky ball (Armitage Bros, UK) — a chewable plastic ball with an internal squeaker.

2. Non-squeaky ball (Armitage Bros, UK) — a chewable plastic ball without an internal squeaker, but which emitted a 'rasping' sound when squeezed.

3. Tug rope (Petlove, UK) — a 30 cm piece of cotton blend rope knotted at both ends.

4. Nylabone chew (Nylabone Products, UK) — a flexible chew made from thermoplastic polymer.

5. Boomer ball (The Company of Animals, UK) — a virtually indestructible impact-resistant pursuit toy.

These toys were chosen since they are frequently provided to dogs housed in rescue shelters and are widely purchased by dog owners. Toys that were impregnated with or contained food were deliberately avoided because it was believed that such stimuli would be inappropriate for regular use in a shelter environment, particularly for pair-housed or group-housed dogs.

Procedure

One week prior to the study any toys that were present in the dogs' kennels were removed. The subsequent week (Week 1) represented the control condition and Weeks 2–6 represented the experimental conditions. At the beginning of Week 2, each dog was provided with one toy, which remained in its kennel for six days. There was an intervening period of one day (ie Day 7) between each of the experimental conditions. At the beginning of the following week, each dog was provided with a different toy, which again remained in the animal's kennel for six days. This procedure was repeated until Week 6, when all of the dogs had been exposed to all of the toys. To control for any potential order effects, dogs were exposed to the five toys in different and randomly assigned sequences. Thus, all 32 dogs experienced the same five experimental conditions but each animal experienced them in a different order.

The behaviour of each dog was recorded on Days 1, 3 and 5, both during the control condition (Week 1) and during each of the experimental conditions (Weeks 2–6). Each animal's behaviour was recorded over a 4 h period using a scan-sampling technique (eg Martin & Bateson 1986). At 10 min intervals the experimenter approached the front of each subject's kennel and recorded the dog's behaviour as soon as she saw the animal. This provided 24 observations of each dog's behaviour per day. The animals were studied at the same time each day (the hours during which the shelter was open to the public: 1000–1400h) to prevent inconsistent exposure to extraneous events in the environment, such as feeding or kennel cleaning.

Three aspects of behaviour that are known to influence public perceptions of dog desirability (Wells 1996), and have been widely employed as measures of captive canine welfare in previous studies (eg Hubrecht 1993, 1995; Mertens & Unshelm 1996; Wells & Hepper 1998, 2000; Wells *et al* 2002a), were recorded at each observation, both in the control and in the experimental conditions. These were: (1) location in the kennel (front or back); (2) vocalisation (barking, quiet or other [includes whining, growling and whimpering]); and (3) activity (standing [supported upright with all four legs], sitting [supported by the two extended front legs and two flexed back legs], resting [reclining in a ventral or lateral position], or moving [walking, running or trotting about the cage]). Whether or not the dog was observed to play with the toy (ie manipulate by chewing, pawing, picking up, etc) was also recorded at each observation.

The number of times that each dog was recorded in each category of location (front and back), vocalisation (barking, quiet and other) and activity (standing, sitting, resting and moving) was summed across each of the 4 h observation periods.

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Data analysis

Three mixed-design ANOVAs (eg Howell 1992) were conducted for the between-subjects factor of dog sex (male, female) and the within-subjects factors of dog behaviour (categories within location, vocalisation and activity), condition (control, squeaky ball, non-squeaky ball, tug rope, Nylabone chew, Boomer ball) and day of observation (Day 1, Day 3, Day 5), to determine the influence of the toys on the dogs' behaviour and to look for changes in behaviour with the length of exposure to each condition.

Data relating to the number of observations that dogs were observed playing with each toy were analysed using a repeated measures ANOVA, with the between-subjects factor of dog sex (male, female) and the within-subjects factors of toy condition (squeaky ball, non-squeaky ball, tug rope, Nylabone chew, Boomer ball) and day of observation (Day 1, Day 3, Day 5) to determine the influence of the different toys on the dogs' play behaviour and to investigate whether the dogs' interest in the toys changed with length of exposure. Only significant results ($P < 0.05$) are reported.

Results

Location in kennel

Analysis revealed a significant main effect of location ($F_{1,30} = 366.11$; $P < 0.001$). A *post-hoc* Newman-Keuls test showed this to be due to dogs spending significantly more of their time at the front of their kennels than at the back (number of observations [mean ± standard error] = 19.87 ± 0.41 and 4.13 ± 0.41 for front and back respectively; $P < 0.01$).

Vocalisation

The ANOVA revealed a significant main effect of vocalisation ($F_{2,60} = 2641.88$; $P < 0.001$). Dogs were found to spend significantly more of their time quiet than barking or engaged in other types of vocalisation (number of observations = 20.30 ± 0.22, 3.30 ± 0.19 and 0.40 ± 0.05 for quiet, barking and other respectively; $P < 0.01$ [Newman-Keuls test]).

Activity

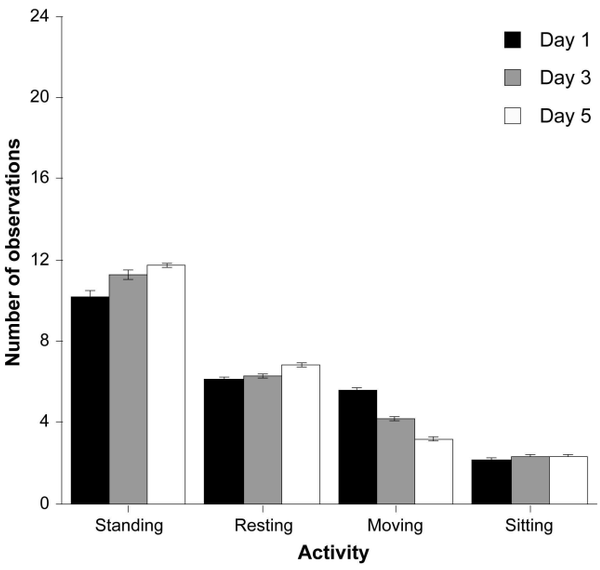
Analysis revealed a significant main effect of activity ($F_{3,90} = 573.34$; $P < 0.001$). Dogs spent significantly more of their time standing than resting, moving or sitting (mean number of observations = 11.07 ± 0.18, 6.40 ± 0.14, 4.29 ± 0.14 and 2.24 ± 0.07 for standing, resting, moving and sitting respectively; $P < 0.01$ [Newman-Keuls test]).

Pooling all data, the dogs' activity changed significantly across the days that they were observed ($F_{6,180} = 20.44$; $P < 0.001$). Dogs spent significantly ($P < 0.001$) more of their time moving and less of their time standing on Day 1 of each condition than on Days 3 or 5 (see Figure 1).

The dogs' activity was significantly related to condition ($F_{15,450} = 23.57$; $P < 0.001$). Tests for simple effects showed that the dogs spent significantly ($P < 0.001$) less of their time standing and more of their time moving during the squeaky ball, non-squeaky ball and Nylabone chew conditions than during the control, tug rope or Boomer ball conditions (see Figure 2).

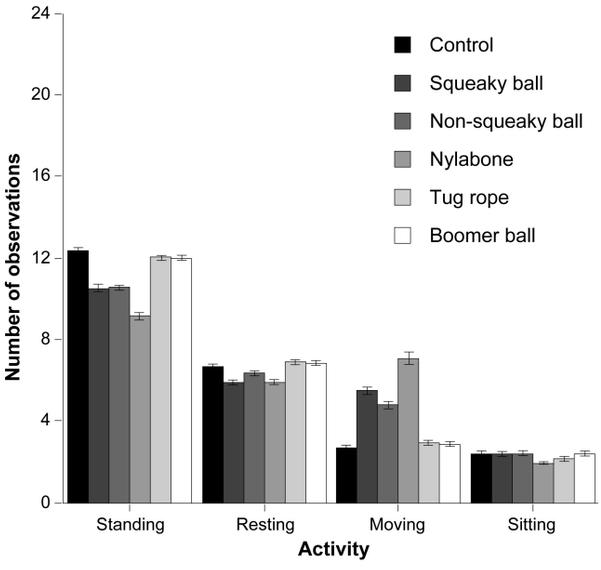
There was a significant three-way interaction between activity, toy condition and day of observation ($F_{60,900} = 5.02$; $P < 0.001$; see Table 1). The squeaky ball, non-squeaky ball and Nylabone chew conditions were

Figure 1



The mean (± standard error) number of observations (out of 24) for all conditions combined in which dogs were recorded in each type of activity on Days 1, 3 and 5 of observation.

Figure 2



The mean (± standard error) number of observations (out of 24) in which dogs were recorded in each type of activity during the control condition and five toy conditions.

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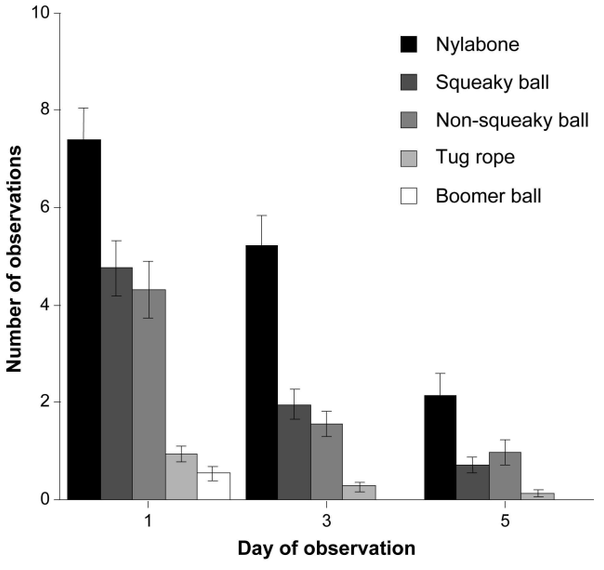
Table 1 The mean (± standard error) number of observations (out of 24) in which dogs were recorded in each type of activity during the control condition and five toy conditions on Days 1, 3 and 5 of observation.

Activity	Condition					
	Control	Squeaky ball	Non-squeaky ball	Nylabone chew	Tug rope	Boomer ball
Standing						
Day 1	12.36 (0.55)	8.17 (0.74)	8.62 (0.57)	8.24 (0.54)	12.02 (0.35)	11.95 (0.52)
Day 3	12.53 (0.53)	10.97 (0.39)	10.28 (0.37)	9.02 (0.35)	12.10 (0.37)	11.87 (0.56)
Day 5	12.20 (0.44)	12.37 (0.53)	12.63 (0.36)	10.17 (0.49)	11.96 (0.47)	12.15 (0.41)
Resting						
Day 1	6.47 (0.48)	5.85 (0.35)	6.49 (0.41)	5.07 (0.27)	6.68 (0.25)	6.34 (0.49)
Day 3	6.43 (0.42)	5.33 (0.31)	5.91 (0.26)	5.74 (0.50)	7.24 (0.35)	7.09 (0.44)
Day 5	7.01 (0.46)	6.40 (0.42)	6.18 (0.32)	6.84 (0.27)	6.81 (0.45)	7.05 (0.44)
Moving						
Day 1	2.85 (0.22)	8.14 (0.98)	6.74 (0.57)	9.18 (0.64)	3.14 (0.24)	3.38 (0.27)
Day 3	2.80 (0.28)	5.15 (0.28)	5.24 (0.35)	7.37 (0.61)	2.66 (0.25)	2.80 (0.29)
Day 5	2.34 (0.24)	3.24 (0.24)	3.41 (0.33)	4.57 (0.55)	2.97 (0.25)	2.34 (0.24)
Sitting						
Day 1	2.38 (0.22)	2.51 (0.24)	2.14 (0.21)	1.51 (0.15)	2.15 (0.23)	2.38 (0.22)
Day 3	2.29 (0.20)	2.70 (0.18)	2.57 (0.20)	1.85 (0.14)	1.99 (0.18)	2.29 (0.20)
Day 5	2.45 (0.24)	1.96 (0.18)	1.78 (0.19)	2.41 (0.17)	2.38 (0.22)	2.45 (0.24)

Figure 3



The mean (± standard error) number of observations (out of 24) in which dogs were recorded playing with each type of toy on Days 1, 3 and 5 of observation.

associated with significantly less standing on the first and third days of the toys' introduction to the kennels than were any of the other conditions ($P < 0.001$ for all paired *t*-tests). The number of observations of standing returned to approximately control levels by Day 5 ($P > 0.05$ for all paired *t*-tests), both in the squeaky and non-squeaky ball conditions. However, in the Nylabone chew condition, observations of standing on Day 5 remained significantly lower than in all other conditions ($P < 0.001$ for all paired *t*-tests). In relation to the control condition, neither the tug rope nor the Boomer ball had a significant effect on the dogs' activity on any of the observation days ($P > 0.05$ for all paired *t*-tests).

Play

Overall, the dogs spent very little of their time playing with the toys (mean number of observations = 2.05 ± 0.16; 8.53% of all observations). The ANOVA revealed a significant main effect of toy condition on play ($F_{4,120} = 40.55$; $P < 0.001$). Dogs spent significantly more of their time playing with the Nylabone chew than with any of the other toys (mean number of observations = 4.87 ± 0.52; $P < 0.01$ [Newman-Keuls test]). Dogs also spent significantly more of their time playing with the squeaky ball and non-squeaky ball than with the tug rope or the Boomer ball (mean number of observations = 2.47 ± 0.32, 2.28 ± 0.31, 0.44 ± 0.09 and 0.18 ± 0.05 for the squeaky ball, non-squeaky ball, tug rope and Boomer ball respectively; $P < 0.01$ [Newman-Keuls test]).

There was also a significant main effect of day of observation ($F_{2,60} = 144.99$; $P < 0.001$). The dogs were observed playing with toys significantly more on Day 1 than on Days 3 or 5 (mean number of observations = 3.56 ± 0.26, 1.79 ± 0.15 and 0.78 ± 0.11 for Days 1, 3 and 5 respectively; $P < 0.01$ [Newman-Keuls test]).

Analysis revealed a significant interaction between the type of toy and the day of observation ($F_{8,240} = 23.46$; $P < 0.001$).

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Tests for simple effects showed that the dogs spent significantly ($P < 0.001$) more of their time playing with the Nylabone chew than with any of the other toys on all days of observation; however, their interest in this toy decreased over the time it was present in their environment. Both the squeaky and non-squeaky balls encouraged significantly ($P < 0.001$) more play from the dogs than did the tug rope or Boomer ball on Days 1 and 3 of their introduction into the kennels. By Day 5, however, the dogs' interest in the squeaky and non-squeaky balls had considerably waned. The Boomer ball elicited no interest from the dogs whatsoever following the first day of its introduction into the kennels (see Figure 3).

Discussion

The findings of the present study indicate that the behaviour of kennelled dogs is significantly influenced by the type of toys they are exposed to, but that the dogs' interest in toys wanes over time. Overall, the dogs spent relatively little of their time playing with the toys provided. Indeed, dogs were observed interacting with the toys for only approximately 8% of the total observation time (although see later). This finding concurs with existing work in this area and supports earlier suggestions that dogs housed in rescue shelters, unlike those housed in other captive environments (eg laboratories), have relatively little interest in toys (Wells & Hepper 1992, 2000). Rescue shelters are extremely stimulating environments, with high levels of noise and intermittent interruptions from staff and visitors. Such disturbances in the environment of rescue shelter dogs may attract the animals' attention and overpower their interest in toys.

The age of the dogs may also explain, in part, the animals' relative lack of interest in toys. One must question the extent to which solitary object play is of value to adult dogs. An investigation into the effects of age on the play behaviour of dogs housed in kennels may yield useful information regarding the value of objects such as toys to animals of different ages.

Whilst the dogs showed little *overall* interest in the toys, certain toys elicited a considerable amount of attention. The Nylabone chew was found to be the most popular toy, with dogs spending more of their time playing with this than with any other toy. Existing research in this area suggests that Nylabone products are also popular amongst dogs housed in laboratories (DeLuca & Kranda 1992; Hubrecht 1993, 1995). Interestingly, Wells and Hepper (2000) reported that dogs in rescue shelters showed virtually no interest in the introduction of Gumabone to their kennels, a stimulus that is similar in texture, shape and size to the Nylabone chew employed in the present study. The manner in which the two toys were presented to the dogs (ie free in the environment in the current study versus secured to the kennel fixtures in Wells and Hepper [2000]) may explain the discrepancy in these findings: perhaps dogs have a greater preference for loose, as opposed to constrained, items.

Both the squeaky and non-squeaky balls elicited a relatively similar amount of attention from the dogs, suggesting that the type of noise a toy emits may be of less value to dogs than the fact that the toy can be chewed. Toys that are manufactured with artificial squeakers, which have the potential to come loose and be swallowed, might be considered more dangerous for dogs than those without such foreign objects. Since dogs do not appear to have an apparent preference for one over the other, it might be wiser to provide them with balls without potentially harmful artificial squeakers.

The dogs showed very little interest in the Boomer ball: indeed, many ignored its introduction into their kennels altogether. The Boomer ball is a robust, solid, plastic ball that has been promoted specifically as a potential enrichment item for captive animals. Whilst one can only speculate as to why the dogs in the present study showed so little interest in this particular toy, its lack of appeal might be largely due to its inability to be chewed or even to be picked up. Interestingly, DeLuca and Kranda (1992) noted that virtually all of the laboratory-housed dogs in their study ignored a similar indestructible polypropylene ball.

As with the Boomer ball, the tug rope attracted little attention from the dogs. This may again be due to the nature of the toy, which has been designed to encourage either dog–dog play, or dog–human play (see Rooney *et al* 2000). All of the dogs in the present study were housed singly, hence preventing the possibility of physical interaction between dogs, and perhaps reducing the animals' motivation to explore such a 'dual-player' type of toy. Pair or group-housed dogs, however, might be more inclined to play with such a toy. Further work is required to determine whether the number of dogs housed together in a rescue shelter has an influence upon their interactions with toys in the environment.

The dogs' interest in the toys waned considerably over the course of the five day observation period, suggesting that the animals habituated to the toys. DeLuca and Kranda (1992) noted that laboratory dogs also habituated to toys, although did not specify exactly how long it took for these animals to lose interest in the various objects. Interestingly, Hubrecht (1995) reported that laboratory-housed dogs continued to play with toys two months after their introduction. This discrepancy may be largely age-related. The dogs in the present study and in that of DeLuca and Kranda were all adults, whilst those in Hubrecht's (1995) study were under four months of age. Since pups tend to be more playful and curious than older dogs, it is perhaps not surprising that they continued to express an interest in the toys.

In the present study, the speed at which dogs habituated to the toys was stimulus-specific. Thus, dogs were slower to habituate to the Nylabone chew than to any of the other toys; again highlighting the popularity of this particular toy. Whilst interest in the squeaky and non-squeaky balls was relatively high on the first day of their introduction, by Day 3 the dogs directed relatively little attention towards these toys.

The presence of a toy in the dogs' environment had no significant effect upon the animals' location in their kennels or upon their vocalisations. Certain toys, however, had an

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influence upon the dogs' activity. Specifically, during the Nylabone chew and the squeaky and non-squeaky ball conditions, the dogs spent less time standing and more time moving. The increase in movement was undoubtedly related to the increment in play that these particular toys generated. Thus, it was noted that while the dogs played with these toys they were also moving around their kennels simultaneously.

The dogs' sex had no significant effect on any of the behavioural measures, suggesting that male and female dogs in rescue shelters behave similarly and respond to toys in a similar manner. This finding is in line with previous research of this type (Wells & Hepper 2000).

As with all work of this nature, one cannot ignore the impact that disruptions in the environment may have had on the animals' behaviour. Interruptions from visitors, staff and the experimenter may all have affected the dogs' location in their kennels, and their activity, vocalisation and play. To control for such factors, testing was always conducted on days that the shelter was open to the public, thus dogs were exposed to a relatively similar number of visitors on each day of observation. In addition, both the staff and the experimenter made as much effort as possible to avoid being seen by the subjects. Despite adopting such control measures, the possibility that the dogs were influenced by extraneous environmental disturbance should not be ignored.

Animal welfare implications

Despite the relatively low levels of interest that the dogs in the present study showed in the toys, the welfare of rescue shelter dogs may still be slightly enhanced by the provision of such stimuli in their kennel environment. Enrichment through the provision of toys may have a positive effect upon the welfare of sheltered dogs, helping to reduce boredom and encouraging animals to spend more of their time exploring their environment. Dogs in the present study, for example, were found to spend less time inactive and more time moving around their kennels following the introduction of a toy.

Certain types of toy are more likely than others to offer interest and hence welfare advantages to dogs in rescue shelters. As with dogs housed in laboratories, shelter dogs appear to have a strong preference for toys that can be chewed (eg Nylabone). The novelty of the toy is also of key importance and the dogs in this study lost interest in the same toy over time. The introduction of a novel toy, however, generated renewed interest. Rotating toys, so that dogs are regularly exposed to novel stimuli, may be one means of reducing habituation to toys and of encouraging exploration in rescue shelter dogs.

Toys may also have an indirect effect upon the welfare of shelter dogs, and it may be in the dogs' best interests to have such stimuli in their kennels even if they are not utilised. It has been reported that potential adopters prefer dogs that have enrichment items (eg a toy ball) in their kennels to dogs that are held in barren pens, even if the animal is not actually seen playing with the device (Wells & Hepper 1992; Wells 1996). The presence of a toy in its kennel also greatly increases a dog's chance of being re-homed (Wells & Hepper 2000), perhaps because potential adopters might view a dog with toys in its kennel as a desirable pet rather than as an unwanted animal.

Increased activity as a result of the provision of toys may also have an indirect effect upon the welfare of rescue shelter dogs. Previous research has shown that visitors to rescue shelters have a much greater preference for dogs that are displaying 'active' behaviours (eg moving) to 'sedentary' behaviours (eg sitting, standing, resting or sleeping) (Wells 1996). Dogs that are observed moving around their kennels are perceived to be more sociable, friendly and outgoing than those that remain predominantly inactive. By providing dogs with novel toys on a regular basis and hence increasing the amount of time that they spend displaying behaviours that are preferred by potential adopters, the adopters' perceptions of these animals might be improved. This in turn may improve a dog's chance of being adopted. Whether or not increased activity is synonymous with improved animal welfare, however, remains unknown and warrants investigation.

The fact that the dogs in the present study spent so little time playing with the toys suggests that other stimuli were perhaps more interesting to the animals than the toys. 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 both with conspecifics and with humans (eg Fox 1965). It is also an opportunist, spending much of its time active, and needing a highly stimulating environment to explore (Morris 1964). In addition to enriching the kennel environment with toys, the provision of regular walks, training, grooming and group play sessions may provide some of the social, mental and physical stimulation that dogs require. Keeping singly housed dogs in pens that allow them to see conspecifics and/or introducing appropriate forms of auditory stimulation (eg classical music) may also be of value to the welfare of kennelled dogs (Wells & Hepper 1998; Wells *et al* 2002b).

Overall, the findings of this study suggest that certain types of toy may be advantageous to the welfare of sheltered dogs by encouraging play and reducing levels of inactivity. Toys that could be chewed appeared particularly popular, although the dogs lost interest in all types of toy when they were available continuously. Nowadays, toys are routinely provided to many dogs housed in rescue shelters, however, the findings of this study suggest that, in addition to their provision, the rotation of toys is very important. The implementation of other types of environmental enrichment in addition to toys (eg social housing) is also strongly recommended for kennelled dogs.

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