

# Papers

## Knowledge and attitudes of 52 UK pet rabbit owners at the point of sale

J. L. Edgar, S. M. Mullan

**The aim of this study was to determine the knowledge and attitudes of pet rabbit owners at the time of buying their rabbit(s) and to investigate factors influencing the planned husbandry and housing of their rabbit(s). A questionnaire was used to assess the impact of demographics, knowledge and attitudes on the likelihood that respondents would neuter their rabbit(s), feed them an appropriate diet, house them in appropriately sized housing and provide them with an appropriate companion. Knowledge and attitudes were significant factors in whether respondents planned to neuter their rabbit(s) and provide them with an appropriate companion. The attribution of secondary emotions to rabbits was associated with plans to feed a mix-type diet. The majority of owners had carried out prior research into pet rabbits, but owners had a limited knowledge of the needs of rabbits, particularly with respect to their diet and social needs. Respondents who had decided to purchase a rabbit on the day were less likely to intend to get their rabbit neutered than those who had taken more time to decide to buy a rabbit.**

THE degree of pet owners' knowledge about the health, welfare and husbandry of their pets is considered to be an important contributor to companion animal welfare. Indeed, campaigns to improve pet animal welfare by animal welfare charities often involve attempts to raise awareness and educate about welfare issues, although a direct link between education and subsequent improvements in animal welfare has not yet been empirically studied. In the UK, there are currently approximately 1.7 million rabbits kept as pets, making them the third most popular mammalian pet (PDSA 2011). Rabbits are a naturally social species and in the wild have a home range of around 7000 to 20,000 m<sup>2</sup> (Mykytowycz 1958, Lehmann 1991, Devillard and others 2008). Despite decades of domestication, rabbits' behavioural repertoire has changed little (Stodart and Myers 1964, Vastrade 1986, Lehmann 1991, Held and others 1995). Pet rabbits are traditionally bought as a child's pet, housed in a hutch and fed a concentrate diet (Mullan and Main 2006); there are discrepancies between these husbandry conditions and rabbits' environment of evolutionary adaptation.

In a survey of 102 pet rabbit owners, Mullan and Main (2006) found several health and welfare problems, including dental disease (30 per cent of rabbits), single housing (44 per cent of rabbits) and a low provision of environmental enrichment (42 per cent of rabbits). Additionally, a large majority of rabbits (84 per cent) were housed in a hutch smaller than is recommended by the Rabbit Welfare Association and Fund (RWF) and the PDSA (6 ft x 2 ft x 2 ft, or 0.68 m<sup>3</sup>) (RWF 2004, PDSA 2010). In the case of dental disease, the majority of owners of rabbits with signs of dental disease were un-

ware of the problem. Forty-five per cent of rabbits were fed a mix-type diet, which is an important risk factor for the development of dental disease (Harcourt-Brown 1996, 1997). An earlier survey of veterinary practice clients by Harcourt-Brown (1996) found that 99 per cent of rabbits were fed a mix-type diet. Although this difference between the two surveys might be due to differences in recruitment style, it could also be attributed to an improvement in the knowledge of owners about rabbit nutrition along with an associated increase in availability of more appropriate foods.

There is an abundance of literature on fundamental research into attitudes to pet animals, particularly within the human psychology literature (see Serpell 2004 for a review). The Pet Attitude Scale (PAS), an 18-item Likert-style survey, was developed in 1981 as a measure of favourableness towards animals (Templer and others 1981,) and has since been modified and updated (Munsell and others 2004). The PAS has been used to investigate correlations between attitudes towards pets and empathy towards human beings (Preylo and Arikawa 2008), and to compare empathy levels in men and women (Daly and Morton 2006) and in dog and cat owners (Daly and Morton 2003). In terms of applied animal research, studies have shown that measures of the attitudes of stockpeople are correlated with increased production in farm animals (eg, Waiblinger and others 2002), and an improvement in the human-animal bond has been proposed to enhance laboratory primate welfare (see Rennie and Buchanan-Smith 2006 for a review). Various studies have investigated associations between companion animal welfare and the characteristics of the owners, such as their sex, level of education, marital status and social life (eg, Marinelli and others 2007). However, the extent to which owners' knowledge of and attitudes towards the health, welfare and husbandry of pets affects companion animal welfare has not yet been studied.

The aim of this study was to determine the knowledge and attitudes of pet rabbit owners at the point of sale of the rabbits. Additionally, it aimed to investigate the association between owners' knowledge and attitudes with the planned husbandry and housing of their rabbit(s). It was hypothesised that rabbit owners with both a greater knowledge of the needs of rabbits and a more favourable attitude to rabbits and pets in general would be more likely to plan to house their rabbits in conditions conducive to good welfare.

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For each question, please tick **ONE** statement that you **MOST** agree with:

10a) A pet rabbit should be fed high-quality nutritious food from an open bowl	[ ]
b) A rabbit under human care should be able to find its food quickly and easily	[ ]
c) Feeding devices that would increase the amount of time a rabbit spends trying to feed could be good for welfare, as long as the food was nutritious and the device could be cleaned	[x]
d) Feeding devices that would increase the amount of time a rabbit spends trying to feed are likely to cause the rabbit to feel frustrated	[ ]
11a) A pet rabbit would prefer to be kept with other rabbits	[x]
b) A pet rabbit is OK if it has the companionship of a human	[ ]
c) Companionship is not important to a rabbit	[ ]
d) Rabbits prefer to be on their own	[ ]
12a) A pet rabbit should have access to a large area outside, as well as somewhere safe and sheltered to rest	[x]
b) A pet rabbit does not need lots of space, as long as it is provided with appropriate shelter	[ ]
c) Pet rabbits are adapted to living in hutches	[ ]
d) Pet rabbits should be free to safely roam as and where they like	[ ]

FIG 1: Multiple-choice questions (adapted from Wensley 2003) that were used to produce an overall knowledge score of 0 to 3 (correct answers are indicated by x)

## Materials and methods

The questionnaire was distributed by pet shop staff in three large pet shops/garden centres in south-west England. Pet shop staff were asked to give one questionnaire to the responsible adult (aged 18+) purchasing one or more rabbits. Owners were requested to return the questionnaire by post using a prepaid envelope. The incentive for the respondents to complete the questionnaire was entry into a prize draw to win a pet shop voucher.

Throughout the questionnaire, the new owners were asked questions about themselves, their plans for the husbandry of the rabbit(s), how they felt about rabbits and what they knew about rabbits. Both open and closed questions were used to gain information on demographics (the owner's age, sex and education), when the owners decided to purchase their pet rabbit(s) and their motivations for doing so; who would be the main carer of the rabbit; the respondent's experience with rabbits; the intended housing (type, size and location) of the rabbit(s); intended veterinary care (initial check-up and neutering), intended diet and whether their rabbit(s) would have a companion. The modified PAS (Munsell and others 2004) produced a score between 18 and 126 to determine how the owners felt about pets in general. Additional questions prompted owners to choose from a list of primary emotions (anger, surprise, love, happiness, pleasure, fear) and secondary emotions (hate, embarrassment, guilt, shame, grief, pride, jealousy) that they thought rabbits were capable of experiencing, in order to determine how they felt about rabbits specifically. Additionally, multiple-choice questions on diet, life span and behavioural and social needs (Fig 1) were combined to produce an overall knowledge score, and any research (leaflets, internet, books, veterinary advice) already carried out by the owners was reported.

## Statistical analysis

All data were analysed using PASW Statistics 17. Direct logistic regression was performed to assess the impact of a number of factors on the likelihood that respondents would neuter their rabbit(s), feed them an appropriate diet and provide their rabbit(s) with a companion. Multiple regression enabled the assessment of factors likely to contribute to the size of the hutch. Both models contained a number of independent variables: age, sex, education, whether respondents had done prior research on pet rabbits, when they decided to purchase their rabbit(s), whether rabbit(s) had been bought as an adult's, child's

or family pet, PAS score, knowledge score and the number of primary and secondary emotions that respondents thought rabbits were capable of experiencing. A Spearman's rank correlation was used to investigate the relationship between knowledge and PAS score.

## Results

Fifty-two surveys were returned; 90 per cent of respondents were female, and the majority (57 per cent) were in the 30 to 39 age range. Eighteen per cent of participants had decided to buy their rabbit(s) on the day, 10 per cent less than a week ago, 37 per cent one week to one month ago, and 29 per cent more than a month ago (6 per cent did not answer this question). Thirty-nine per cent of respondents bought the rabbit(s) as a pet for a child, with 6 per cent of respondents indicating that the main carer of the rabbit would be a child. Thirty-five per cent of respondents bought the rabbit as a pet for themselves and 16 per cent for the whole family. Ten per cent bought the rabbit as a companion for either another rabbit or a guinea pig. The majority of respondents (58 per cent) chose personality/friendliness as the most important factor when choosing a pet rabbit. Forty-four per cent of

respondents bought a male rabbit and 50 per cent bought a female rabbit, with 6 per cent buying one of each sex. The majority of rabbits purchased were dwarf lops (65 per cent); other breeds were rex (25 per cent), lionhead (2.5 per cent) and crossbreed (7.5 per cent).

Eighty-one per cent of respondents had already done some research into rabbit ownership, with leaflets (71 per cent), pet shop staff (69 per cent) and books (61 per cent) being the most frequently used resources. Books (38 per cent), a veterinary surgeon (25 per cent), the internet and leaflets (both 19 per cent) were considered to be the most useful resources, with veterinary surgeon, books and the internet (all 29 per cent) being the most preferred. The respondents had variable experience with rabbits: for 29 per cent, the rabbit being bought on the day of responding to the questionnaire was their first pet rabbit, 19 per cent already had a pet rabbit, 56 per cent had owned a rabbit in the past, and 60 per cent already owned other species of companion animal. When handling rabbits, 56 per cent of respondents indicated that they were 'very confident', 42 per cent 'moderately confident' and 2 per cent 'not very confident'.

Table 1 summarises the impact of knowledge and PAS score on the likelihood that respondents would neuter their rabbit(s), feed them an appropriate diet, house them in an appropriately sized hutch and provide their rabbit with a companion.

## Veterinary care

Ninety per cent of participants planned to take their rabbit(s) for an initial veterinary check-up, with 52 per cent planning to get their rabbit(s) neutered. The most common reason (95 per cent of those who chose not to opt for neutering) for not opting to neuter the rabbit was that it would have no access to rabbits of the opposite sex. Of those who opted to neuter, reasons for neutering including the prevention of behaviour problems (56 per cent) and health reasons (11 per cent). PAS score was a significant factor ( $P=0.027$ ) in whether owners planned to get their rabbit(s) neutered, with those opting to neuter having a higher PAS score (odds ratio [OR] 0.924, 95 per cent confidence interval [CI] 0.862 to 0.991). When respondents had decided to purchase their rabbit(s) was a significant factor ( $P=0.001$ ) in whether they planned to get their rabbit(s) neutered (OR 4.225, 95 per cent CI 1.822 to 9.796), with respondents who had decided to purchase their rabbit(s) on the same day being less likely to plan to get it neutered, and those who had decided to purchase their rabbit(s) more than a month ago being more likely to opt for neutering. Fig 2

**TABLE 1: Mean (se) knowledge score and Pet Attitude Scale (PAS) score of rabbit-owning respondents, classified according to certain aspects of rabbit health and welfare**

Aspect of health and welfare	Knowledge score	P*	PAS score	P*
Planning to neuter?				
Yes	2.11 (0.15)	NS	111.9 (2.01)	0.027
No	1.67 (0.19)		105.6 (1.58)	
Planned concentrate diet				
Pellets	2.00 (0.24)	NS	111.0 (0.85)	NS
Mix-type	1.95 (0.15)		109.6 (1.53)	
Expected hutch size				
≥0.68 m <sup>3</sup>	2.06 (0.28)	NS	107.0 (3.64)	NS
<0.68 m <sup>3</sup>	2.00 (0.21)		109.9 (2.30)	
Planned companion				
None	1.40 (0.15)	0.000	101.9 (2.10)	0.004
Rabbit	2.42 (0.15)		113.6 (0.95)	
Guinea pig	1.57 (0.37)		113.4 (3.74)	

\* P value indicates whether knowledge or PAS score was a significant factor in a certain aspect  
NS not significant

illustrates associations between owners' plans to neuter their rabbit(s) and whether they had carried out prior research on rabbits.

### Diet

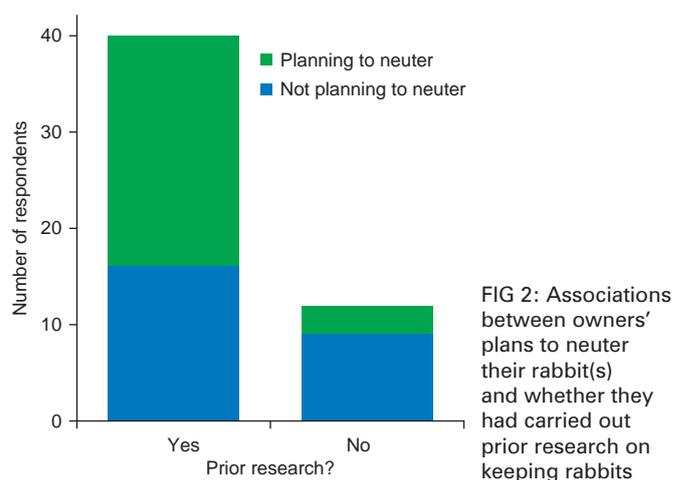
All 52 respondents planned to feed their rabbit(s) concentrate food as part of their diet, with 29 per cent opting for a mix-type diet, 25 per cent nuggets, and 46 per cent unspecified concentrate food. Forty per cent of respondents planned to include hay or grass in their rabbits' diets. The number of secondary emotions that the respondents thought rabbits were capable of experiencing was a significant factor ( $P=0.020$ ) in the planned choice of diet (OR 5.06, 95 per cent CI 1.30 to 19.76), with respondents who attributed a greater number of secondary emotions being more likely to plan to feed a mix-type diet (Fig 3).

### Housing

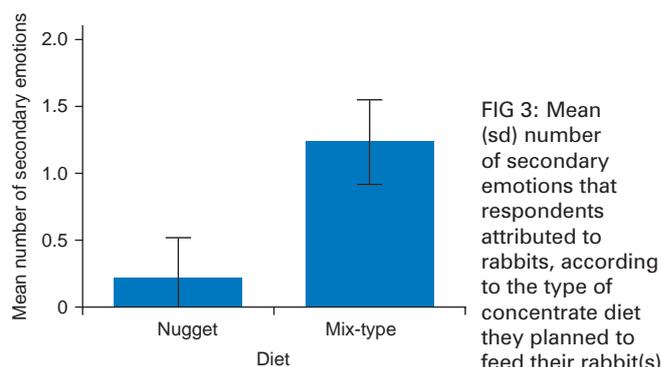
Eighty-eight per cent of respondents planned to keep the rabbit(s) in a hutch (61 per cent in the garden, 25 per cent in an outbuilding and 2 per cent in the house), 6 per cent planned for the rabbit to be kept as a house rabbit and 6 per cent did not specify. When asked what were the most important factors when buying a hutch, 85 per cent of the respondents indicated size, with the second most frequently given factor being cost (25 per cent) (Fig 4). When asked what size hutch their rabbit(s) would be housed in, 50 per cent of respondents did not respond. Of the respondents who did answer, 40 per cent planned to house the rabbit(s) in a hutch larger than 0.68 m<sup>3</sup> (the RWA/PDSA minimum recommended size), 40 per cent between 0.68 m<sup>3</sup> and 0.34 m<sup>3</sup>, and 20 per cent smaller than 0.34 m<sup>3</sup>. When asked how long their rabbit(s) would spend in the hutch each day, 60 per cent did not respond or did not know. Of the respondents who answered, 38 per cent planned for their rabbit(s) to have permanent access to a run, 38 per cent planned for their rabbit(s) to spend over 12 hours a day in the run and 24 per cent planned for their rabbit(s) to spend 12 hours or under in the run. Eighty-five per cent of respondents planned to provide their rabbit(s) with an area to exercise, with the planned locations being in a run (66 per cent of respondents), the whole garden (39 per cent) and/or in the house (25 per cent), more than one response was allowed. Two per cent of respondents planned to exercise their rabbit(s) on a lead. Fig 5 illustrates the mean hutch size that respondents planned to house their rabbits in, according to whether they had done prior research on rabbits.

### Companionship

Forty per cent of respondents planned to keep their rabbit on its own. When asked why, the most frequent answer (38 per cent) was a lack of space. Forty-six per cent of respondents indicated that their rabbit would have a rabbit companion, and 10 per cent planned to house their rabbit with a guinea pig (4 per cent of respondents did not provide a specific answer to this question). When asked in an open question why they would provide their rabbit with a companion, the majority



**FIG 2: Associations between owners' plans to neuter their rabbit(s) and whether they had carried out prior research on keeping rabbits**



**FIG 3: Mean (sd) number of secondary emotions that respondents attributed to rabbits, according to the type of concentrate diet they planned to feed their rabbit(s)**

(54 per cent) of respondents indicated that this was to provide their rabbit with company; 21 per cent of respondents said that this was because the rabbits were together in the pet shop. Respondents' PAS was a significant factor ( $P=0.004$ ) in whether they planned to provide a companion (OR 1.14, 95 per cent CI 1.04 to 1.25), with respondents who planned to provide a rabbit companion having a greater PAS than those who planned to provide no companion. Additionally, knowledge score was a significant factor ( $P=0.000$ ) in whether they planned to provide a companion (OR 5.36, 95 per cent CI 2.10 to 13.72), with respondents who had a higher knowledge score being more likely to provide a rabbit companion than those who planned to provide no companion.

### Attitudes

In the PAS, all respondents scored between 80 and 126 (Fig 6). The most frequent score range (45 per cent of respondents) was 111 to 120. The primary and secondary emotions attributed to rabbits by the respondents are illustrated in Fig 7. There was no correlation between owners' knowledge and PAS score ( $r=0.27$ ,  $n=49$ ,  $P=0.059$ ).

### Discussion

Although pet shop staff were asked to give a questionnaire to every customer who purchased a pet rabbit, self-presentation biases are likely to have influenced the results. Particularly keen rabbit owners might have been more likely to respond and thus make up the majority of the respondents, and it is also likely that pet shop staff might have been more inclined to hand out a questionnaire to a particular type of person. The target recipients of the survey were customers of large pet shops/garden centres in south-west England, and might not be representative of owners in the UK overall. In particular, owners of rabbits acquired from rescue centres, breeders and friends, as well as owners from other regions of the UK, are not represented here. It is also important to consider that many of the questions in the survey referred to the owners' plans for the housing and husbandry of their rabbit(s); it was not possible to ascertain whether these plans would remain in place throughout ownership.

Although rabbits have been traditionally portrayed as a children's pet, the number of respondents purchasing the rabbit(s) as a pet for themselves was similar to those purchasing them as a pet for a child.

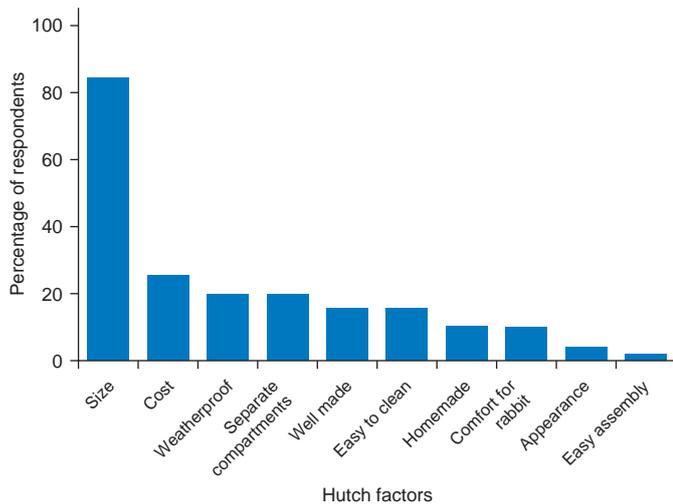


FIG 4: Factors influencing respondents' choice of hutch for their rabbit(s) (more than one answer was possible)

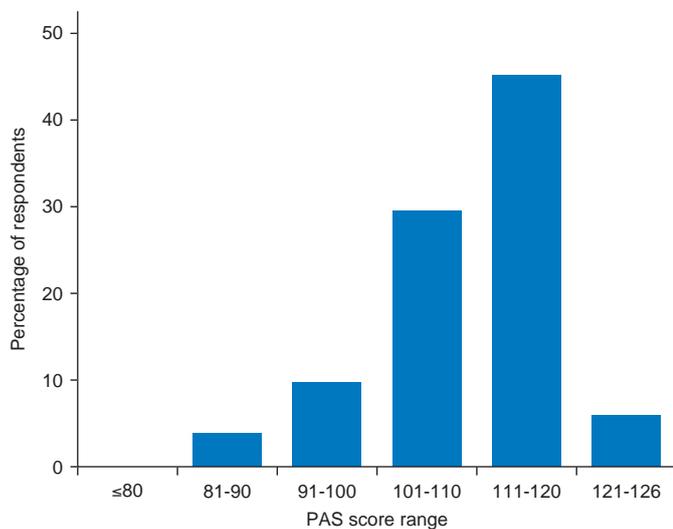


FIG 6: Pet Attitude Scale (PAS) score of rabbit-owning respondents. Higher scores (maximum 126) indicate more favourable attitudes to pets

A large majority of respondents (81 per cent) had carried out prior research into pet rabbits. There were discrepancies between the most frequently used and the most preferred resources used for research purposes, with leaflets, pet shop staff and books being the most frequently used resources, and a veterinary surgeon, books and the internet being the most preferred. It is impossible to determine from this study which particular resource might be the most effective means of education about rabbit health and welfare. Veterinarians have access to accurate, science-based recommendations, whereas the accuracy of resources such as leaflets, books and the internet cannot be guaranteed. Pet shop staff also have the potential to provide timely, accurate recommendations, but up-to-date, effective training is essential if they are to do so.

A high proportion of respondents (90 per cent) planned to take their rabbit for an initial veterinary check-up. As veterinarians were one of the resources that owners reportedly most preferred to use, this provides great opportunity for veterinarians to educate owners on the needs of rabbits during this first consultation; there may be potential for 'new rabbit consultations', similar to the first extended consultations that many veterinary practices offer for the new owners of puppies and kittens. Fifty-one per cent of the respondents planned to neuter their rabbit(s), with those who planned to neuter their rabbit(s) having a higher score on the PAS than those who did not. A large majority of those who did not plan to get their rabbit(s) neutered stated that this was because the rabbit would have no access to the opposite sex. This might indicate that respondents who chose not to

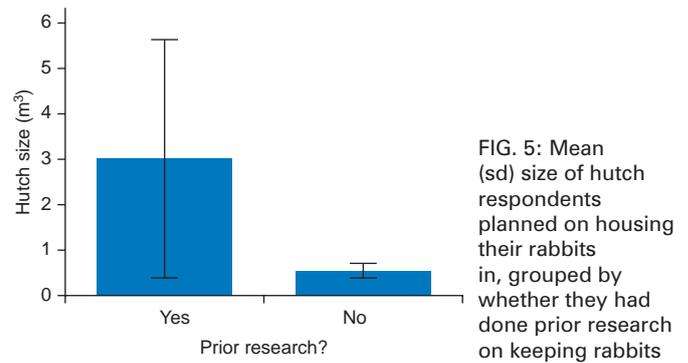


FIG 5: Mean (sd) size of hutch respondents planned on housing their rabbits in, grouped by whether they had done prior research on keeping rabbits

opt for neutering were unaware of the health and behavioural reasons for neutering. Although vets are best placed to advise on neutering, there is also a responsibility for pet shops to provide basic advice based on veterinary recommendations. In the present study, owners who had decided to purchase the rabbit on the same day were less likely to plan to get the rabbit neutered. Such 'impulse purchases' leave little time for research into health and welfare or for potential owners to assess whether their chosen pet is the most suitable for their lifestyle and budget.

Of the respondents who specified the type of concentrate diet they intended to feed their rabbit(s), the majority chose a mix-type diet, and less than half planned to include hay or grass. Feeding rabbits a mix-type diet is an important risk factor for the development of dental disease (Harcourt-Brown 1996, 1997). The recommended diet of pet rabbits should consist of around 2 to 3 per cent concentrate and 70 to 85 per cent grass or hay, with the rest made up of fresh vegetable matter (Reusch 2007, Sayers 2010). Although it was not possible to ascertain the proportions of concentrate, grass/hay and vegetable matter that the respondents planned to feed their rabbit(s), the choice of concentrate (mix v pellets) and the lack of hay/grass could lead to future health problems.

As might be expected, a large majority of respondents planned to keep their rabbit(s) in a hutch, and size was cited as the most important factor when purchasing a hutch. Despite this, 60 per cent of respondents planned to keep their rabbit in a hutch smaller than the minimum recommended by the RWF and PDSA, and only 16 per cent planned to providing permanent access to a run. It could be the case that owners were planning to provide their rabbit with a larger hutch as it grew to full size. However, the survey by Mullan and Main (2006) of current owners of rabbits with a mean age of 2.2 years found that 84 per cent of rabbits were housed in a hutch smaller than the minimum guidelines.

Forty-one per cent of respondents planned to keep their rabbit on its own, and this suggests a lack of knowledge of the social needs of the species. Indeed, in the knowledge score assessment question (Fig 1), 60 per cent of respondents thought that a rabbit would be 'OK if it had the companionship of a human'. Both knowledge score and PAS were significant factors in whether respondents planned to provide their rabbit with an appropriate companion, with respondents who had higher scores in both tests being more likely to plan to house their rabbit with an appropriate companion. The most frequently given reason for housing rabbits alone was a lack of space. Mullan and Main (2006) found that hutches bought from pet shops were significantly smaller than homemade hutches. Given the highly social nature of rabbits, available hutches should be big enough to house two rabbits. This puts the onus on pet shops to encourage rabbits to be housed in social conditions by stocking larger hutches with sufficient space for two rabbits.

The most frequent PAS score range in this study was 111 to 120. No published studies have compared PAS scores among the owners of different species of pets, but this score range is very similar to the PAS score attributed to owners of dogs reported by Ellingsen and others (2010). Studies have shown that various factors are correlated with PAS score, such as empathy towards human beings, vegetarianism (Preylo and Arikawa 2008), the presence of childhood pets, nationality and sex (Miura and others 2002). Emotions that respondents attributed to rabbits are illustrated in Figs 7. Respondents attributed

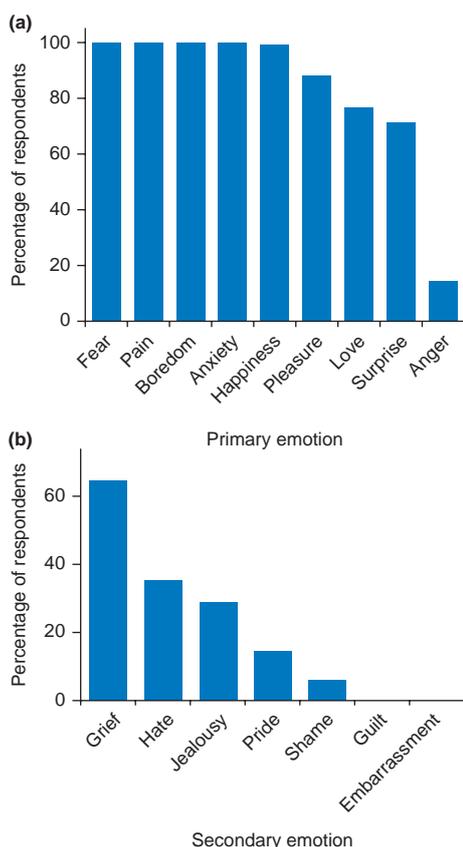


FIG 7: (a) Primary and (b) secondary emotions that respondents attributed to rabbits

a high number of primary emotions to rabbits, and all respondents indicated that rabbits could experience fear, pain, boredom and anxiety. The secondary emotions attributed by respondents were grief, hate, jealousy, pride and shame. In a large-scale survey, Morris and others (2008) determined which primary and secondary emotions were attributed to pets by the owners of different pet species. They found similar levels of emotion attribution for primary emotions throughout the species but differences between owners of different species in attribution of secondary emotions, with dogs, cats and horses being attributed the highest number of secondary emotions by their owners, and rabbits, guinea pigs, hamsters and birds the lowest. In that study, a higher number of secondary emotions was attributed to rabbits by their owners than was found in the present study, but this could have been due to the recruited owners having had their pets for at least two years, thus becoming more familiar with them. It might be expected that the attribution of secondary emotions reflects a more compassionate attitude to pets and thus has a positive effect on pet welfare. However, in the present study, attribution of a greater number of secondary emotions was associated with plans to feed a diet that might contribute to poor welfare. One possible reason for this is that owners themselves might prefer the appearance or smell of a colourful mix-type diet rather than homogenous brown pellets. Anthropomorphism, the attribution of human qualities to animals, has been linked with the development of behaviour problems and compromised welfare in dogs and cats (Bradshaw and Casey 2007). This link between the attribution of secondary emotions and the new owners' plans to feed a mix-type diet highlights the importance of educating owners about the species-specific needs of pets.

Overall, at the point of sale, respondents had a limited knowledge of the needs of rabbits, particularly with respect to dietary and social needs. Although this study highlighted a number of resources that owners used to gain knowledge, it is likely that properly trained pet shop staff and veterinarians are the best source of up-to-date, accurate information on rabbit health and welfare. As the first point of contact, pet shops have an important role in providing for sale appropriate diets and housing, determining whether prospective owners have made the correct choice of pet and educating owners on aspects of diet, housing and social needs. In addition, as the majority of new owners planned to take their rabbit(s) for an initial veteri-

nary check-up, potential exists for specific new rabbit consultations, where the veterinary team can advise new owners, particularly with regard to diet and neutering.

It has been suggested that improvements in companion animal welfare might come about by focusing on education about responsible pet ownership and respect for animals (Miura and others 2002). The present study indicated that the respondents' knowledge and attitudes were factors in aspects of the intended husbandry of their pet rabbit(s), namely whether they planned to neuter their rabbit(s) and house them with an appropriate companion. Further, large-scale research at the point of sale and during pet ownership is needed to investigate the nature and causality of this link and to determine effective methods to improve knowledge and attitudes towards companion animals. Improving knowledge of the needs of animals along with attitudes towards animals (for example, by teaching young people about animal sentience and cognition) might be an important tool in the improvement of companion animal welfare.

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