

Behaviour Problems in the Domestic Rabbit

Anne McBride, Emma Magnus, Georgie Hearne,

Introduction

As pet behaviour counsellors we should be aware that pet species include more than dogs and cats. The third most popular mammal pet species in the UK is the rabbit; a species that has been kept as a pet for over 200 years, though it has been kept as a domesticated species for some 2000 years. Attitudes to this animal have changed quite dramatically since the 1980s as demonstrated by advances in veterinary care, and more latterly pet insurance, in response to demand by owner. Since the 1990s there has been an increase in the house rabbit population and more recently an increased awareness of the role of the pet behaviourist when owners have problems with their rabbit's behaviour. Another reflection of the attitude change is the increasing number of rabbits in rescue societies estimated at 33,000 in 2002, and the increasing number of societies devoted to this single species, currently 300 in the UK alone. Whereas in the past rabbits with behaviour problems would have had a limited lifespan, either being relegated to low level of care until they died, through being abandoned or euthanased.

The rabbit is a common but relatively unknown exotic species. It is often regarded as a "type of cat or dog". Even simple but fundamental differences of herbivore versus carnivore are not always recognised, with owners providing lamb and rice diets to pet rabbits with diarrhoea as they would their pet dog/cat. Whilst meant with the best intentions, sadly such a lack of knowledge of species can lead to welfare issues both of a physical and psychological nature - as in the case above which did not survive this inappropriate treatment.

What is a rabbit?

Perhaps of all the common pet species, the rabbit is the most biologically unique. It is not a member of the rodents, as are the gerbils, chinchillas and mice. The European rabbit is sole domesticated member of the Lagomorph family, which includes the hares and jackrabbits. Yet even within this family the domesticated species has interesting and significant characteristics of its own, in particular relating to the rearing of the young.

The rabbit is an herbivore that has evolved in the harsh conditions of the Iberian Peninsular where the herbage is of low quality. It is a selective feeder that spends around 70% of its active time feeding. It has an efficient digestive system that includes the production of 2 types of faeces, soft ceacal faecal balls and hard faecal droppings. The former are caught from the anus and redigested in a process known as refection. This proper functioning of the gut relies of a high fibre diet. The teeth grow continuously throughout the rabbit's life. They are designed to slice and grind thin strips of vegetation, such as grass and hay. Unlike those of rodents, they are not designed to gnaw hard foodstuffs. The provision of such feeds can lead to the misalignment of the teeth, formation of sharp spikes, abscesses, and consequently death. The need for high fibre content provided in thin strips which take up a substantial portion of the animal's day to eat is why it is strongly recommended that hay and

fresh herbage forms the bulk of the diet, and commercial pellets are provided as a supplement.

In natural circumstances rabbits are rarely seen to drink. This has led to a misconception that rabbits do not need to have a constantly available water supply. However, rabbits like all animals will dehydrate if they get hot or are unable to take in sufficient liquid. In nature this is less likely to happen, rabbits remain cool by being able to go below ground or go into the shade. In addition, feeding primarily at dusk and dawn they obtain a lot of moisture through the dew that has settled on the herbage. It is important to ensure that rabbits always have a freely available source of water.

The rabbit is a prey species, indeed it is one of THE prey species contributing some 20% of the diet to almost 30 different predator species in its native habitat. The rabbit's size means that it provides a neatly packaged, substantial size meal. It has enemies that hunt it at ground level such as fox, cat and dog, other predators attack below ground including these three, but also badger, stoats, weasel, polecat and their domesticated cousin, ferrets. For birds of prey, the rabbit provides a welcome addition to the diet, and young nestling buzzards are fed almost exclusively on rabbits. Of course the predator which allies itself with those that can fly, run or dig and thus catch rabbits is man with his falcons, running dogs, terriers and ferrets, as well as pet cats. Having evolved as Mother Nature's fast food option, it is not surprising that much of its behaviour is orientated towards detection and avoidance of predators.

Rabbits live predominately underground in a complex system of tunnels known as a warren. They spend most of their life in the dark below ground or semi-dark when they emerge between dusk and dawn. This means they are less visible to predators and this also has relevance when rabbit communication signals are considered. One aspect of this is that rabbits do not show obvious signals of pain. The animal that shows weakness is likely to be the preferred target of a predator.

The rabbit has acute senses of sight, hearing and smell to enable it to detect potential danger. By living in groups the efficiency of these 'radar' is increased, often with those on 'sentry' duty choosing higher places such as molehills to stand on. The first response of an individual to danger is to freeze, the second being to flee. Only if caught will a rabbit defend itself by kicking and biting. A rabbit will also warn others nearby of danger by loudly thumping its feet on the ground, a noise that travels both above and below ground.

The need to be able to flee to a place of safety is so important to rabbits that they alter their feeding – vigilance behaviour depending on how far they are from cover and how many other rabbits there are around them. Lack of provision of raised sentinel places and cover in the form of pipes and boxes in rabbit pens can result in stress related problems including agoraphobia and aggression.

Rabbits live in groups the size of which is dependant on population density and availability of resources including suitable sites of burrowing and soil stability – the more stable the soil the deeper the tunnels that can be constructed and thus house more animals. Where burrowing is easy the normal group comprises a single female and her mate. Larger groups tend to have more females than males. Groups tend to

remain stable during the breeding season (January – August in the UK) with a strong hierarchical structure. This breaks down in the remainder of the year, allowing new individuals to integrate into groups. In general females stay with their natal group and juvenile males migrate to new groups, often having spent several months as satellite individuals whilst the breeding season continues. Male hierarchies are linear during the breeding season which controls access to breeding females and within the group the males co-operate in defence of territorial boundaries, through scent deposition and by deterring intruders. Whilst a dominant female will emerge they tend to have a looser hierarchical structure. This may be due to the fact they are more closely related. Having said this, females will become extremely aggressive over resources, in particular nesting sites, during the breeding season and fights to the death can occur. This sudden and dramatic increase in aggression in early spring is often reported by owners whose animals have lived together peaceably for several months, even the best part of a year.

Rabbits display aggression by an escalating series of signals that are often not easily recognised. As with all species this can be motivated by different emotions.

Competitive Aggression

This often arises between rabbits of the same sex, and less commonly in a domestic situation, of opposite sexes.

As we have discussed, male rabbits are particularly territorial during the breeding season, when they form linear hierarchies within their groups. In an encounter with a trespassing individual, the dominant male will often approach the unknown individual, stopping to restlessly nibble at grass, sometimes engage in some marking behaviours or frantically dig at the ground. If the trespasser does not retreat a fight is likely to ensue. The behaviours likely to be seen before outright aggression include chasing, scraping of the ground and stiff-legged runs past each other. Physical violence rarely occurs at this stage; usually these rituals have forestalled it. When it does occur it consists of powerful kicks with the hind legs with rabbits often grabbing each other's necks as they kick. Competitive aggression between females usually follows a similar pattern, however it can be more serious.

Defensive Aggression

Aggression of course can be motivated by fear of a threat, commonly known as fear related or defensive aggression. This is a common cause of aggression towards people and again may result from the rabbit's early warning signs having been misunderstood.

The rabbit will usually begin with subtle signals, such as an increase in muscle tension as the animal freezes, its ears will be held back flat to the head and sometimes they will growl and may try to flee. If these signals are ignored the rabbit may well shift its weight onto its back legs, which can give an appearance of being slightly hunched. The rabbit lunging forward and biting often swiftly follows this. This may be a bite and release as the rabbit runs away, or it may hold and kick.

Other social behaviours

Given that rabbits spend lots of time in the dark and also try to keep their precise location at any one time hidden they don't display much in the way of visual or vocal communication. This causes difficulties for humans who are used to living with species that communicate predominantly through these methods, such as dogs and cats. They do however communicate socially, although these too are subtle. Affiliative signals include tooth grinding, mutual grooming and seeking close contact.

Scent is the main method of communication that rabbits will use, which originates from three different glands on the rabbit's body:

Sub-mandibular gland. This is located under the chin, and domestic rabbits will often be seen rubbing their chin on objects, people and other rabbits. This behaviour acts to pass a common scent profile to members of the group and objects within the territorial boundaries and so may well act as a territorial marker.

Anal-gland secretions. These are deposited with the hard droppings. Rabbits tend to use latrine sites for elimination and all members of the group use these. They are often located on higher ground such as molehills and tree stumps where they act as both a visual marker of territorial boundaries from where the scent can be wafted further afield. This behaviour has been used to advantage by the pet owner who can toilet train their rabbit to use litter trays or single areas in the garden as latrine sites. It should be noted of course that rabbits also drop faeces as they forage and whilst the bulk might end up in the litter tray, others will be spread around the environment.

Inguinal gland secretions. These are deposited with urine, in particular during courtship, and sometimes during territorial disputes. Spraying comprises of the animal running past the target at speed, twisting their hind legs and accurately spraying a jet of urine.

Development

Like puppies and kittens, rabbits are born in an undeveloped state, they are naked, blind and deaf and barely able to move. However, this is where the similarities end. Rabbit maternal care is radically different from that of other species that have undeveloped young.

Rabbit does give birth after a pregnancy of some 28 – 30 days. A fur-lined grass nest is located at the base of a shallow burrow, the entrance of which is blocked with earth whenever the mother is not present – which is most of the time. Rabbit mothers only visit their young once every 20 – 24 hours and then for a mere 3 minutes to suckle them. The young are capable of keeping themselves warm and dry, by eliminating spontaneously once they have fed and then burrowing down into the nest material, only emerging again shortly before the doe is due to return.

Young rabbits will begin to emerge from the burrow in their third week and will be weaned at the end of their fourth. It is then that they start to make their way in rabbit society. The period from birth to sexual maturity is a mere 3 months (this is delayed

in some of the larger domesticated breed). However, in the wild a female born in the early part of the season is likely to have had one or two litters before the season ends.

It may be considered by some that such a brief time with the parent and short period of development would mean that most of rabbit behaviour is comprised of innate fixed action patterns and more complex developmental issues such as socialising and social referencing are not relevant, or at least not important. This is not the case.

Studies have shown that handling rabbits between 10 and 20 days of life can have a profound impact on their later willingness to approach humans. In addition, exposure to other species at this age, including potential predators, can reduce a rabbit's reactivity when they encounter these individuals later on. In one particular experiment, rabbit kittens that had received early exposure to cats did not react fearfully when a cat approached them later on. A similar group, handled only by humans showed an increased likelihood to approach humans at weaning age and non-handled controls avoided both cats and humans suggesting that rabbits have a socialisation process.

Effects of early handling seem long lasting, as handled females in one experiment raised to adulthood were superior to non-handled individuals in breeding performance. Perhaps one explanation is that early handling reduces stress on the doe, enabling her to raise a litter.

Further research to pinpoint this socialisation period and its profile is required. However the evidence to date strongly suggests that rabbits need to be handled early to prevent later problems. Early handling of kittens should be carried out carefully, ensuring that the hands of the handler are first anointed with the scent of the doe.

Owners need to remember that a rabbit which has been well socialised, and thus has the ability to accept several species, will still remain reactive to certain situations. This is because fundamentally they are a prey and flight species and anything can be perceived as a threat.

Being reliant on flight and escaping to a safe place in a natural environment that is continually changing means that rabbits have to have a constantly updated knowledge of the area in which they live. This in turn means that rabbits have a high motivation for exploration and an ability to learn and remember spatial maps. Rabbits are able to learn through habituation, classical and operant conditioning, as well as by observing the behaviour of others. The principles of training can be applied to rabbits, which can be taught a variety of tricks and cues such as coming when called, fetch and even agility. Indeed rabbit agility is gaining popularity as a sport.

Preventative Measures

Prevention starts with knowledge. Prospective owners need to decide if a rabbit is the suitable pet for their lifestyle and to consider which breed is most apt. The acquisition of a rabbit should be taken no more lightly than that of a cat or dog. Rabbits should not be considered a 'short-term', 'convenient' 'low maintenance' pet. When kept in appropriate conditions some rabbits can live for 8 years or more, though for Giant breeds this figure may be nearer five.

Rabbits come in a variety of breeds and sizes, from the tiny Dwarf breeds that weigh around a kilogram to the Giants that can reach the size of a corgi and weigh 10 kilograms. Different breeds also have different temperament characteristics with the smaller breeds generally being more reactive than the larger. This in part reflects the functions for which they were originally bred, the larger breeds having been used for meat or fur production or as laboratory animals, were selected for a less reactive more phlegmatic character. Likewise the lop breeds also tend to be less reactive than similar sized more rangy breeds such as Netherland, Dutch, Polish or, somewhat misleadingly named, Belgian Hare. Unfortunately, many rabbits are purchase on impulse from pet shops, newspaper adverts or at local breed shows. They are often bought as a child's pet – a pet that often does not maintain the child's interest long term and may then be less than adequately cared for – result in physical and behavioural problems.

Having decided on a rabbit and breed, gender is the next consideration. Ideally two rabbits – one of each sex – should be purchased. They should be of similar size, and breed, the easiest option is a litter brother and sister. In this way the rabbits will have constant companionship in a natural group, with none of the possible problems associated with introducing strange rabbits to each other at a later date. As soon as possible both members of the pair should be neutered, reducing the likelihood of any seasonal aggression and unwanted youngsters.

Housing is obviously a major consideration and to some extent will be dependent on an owner's preference. Some will wish to have their rabbit as an indoor pet, as one might have an indoor cat. Others will prefer to keep their rabbits outside, preferably in an integrated hutch and run complex. Whichever arrangement is chosen there are some basic principles that need to be adhered to in order to ensure the welfare of the rabbit and continuation of a good human-rabbit relationship.

Rabbits must be provided with sufficient space that they can move freely, stretch to full length, hop, jump and even run. They should be provided with places in which they can hide, take shelter from the sun and rain, stand up on and be away from draughts. Rabbits need to be kept in a well-ventilated environment though being exposed to draughts can result in respiratory problems. Likewise, whilst rabbits will enjoy some sunbathing, they can easily become overheated and must have access to cool, shady areas. After all they are wearing a fur coat that has often provided good insulation to many human beings!

Rabbits are curious creatures and will play with objects in their environment and should be provided with suitable toys such as the cardboard inner tubes of toilet rolls, toddler teething rings and small footballs. The provision of food should also be adapted to encourage the rabbit to graze. This can be achieved by providing hay in a rack, or within a brown untreated paper bag with some dried or fresh herbs, or threading pieces of green vegetables onto covered wire which can then be suspended from the roof of the hutch or indoor cage. Small branches of untreated fruit trees and leaves can also provide very attractive occupational therapy. There are several toys for rabbits on the market, but not all are totally suitable such as those that encourage the rabbits to use their teeth inappropriately for gnawing.

Last but not least is an appropriate diet comprising mostly hay and fresh greens, with a limited supply of commercial feed and continual access to fresh water. In this way the rabbit will be occupied in a natural manner, namely foraging and grazing, and the likelihood of dental problems, or disease associated with obesity are minimised.

Behaviour Problems

It is only recently that rabbit owners have considered seeking professional treatment for behaviour problems and this means that the area is in its infancy.

The table below outlines four typical rabbit behaviour problems and some of the many possible causes. This highlights the importance of veterinary referral and the need for an extensive case history. Behaviour problems may be multi-causal and treatment rationales will vary from case to case.

Possible Causes	Aggression to other rabbits	Aggression to people	Spraying/inappropriate elimination (please note there is a difference)	Pica
Pain	x	x	x	x
Medical issue	x	x	x	x
Socialisation/social referencing	x	x		x
Inappropriate handling		x		
Hormonal influences	x	x	x	x
Learned response	x	x	x	x
Anxiety response	x	x	x	x
Redirected	x	x		
Territoriality	x	x	x	

To illustrate the complexity of rabbit behaviour problems two case histories and possible differential diagnoses are described in brief below.

Case One

Pet's name: Muffin
Breed: Mini-lop
Sex: Male - entire
Age obtained: 9 weeks of age
Previous Environment: Outside hutches
Current Environment: House rabbit.
Age: 6 months
Medical History: Physical examination was unremarkable.
Diet: Hay, fresh grass and household greens, as well as one quarter of a rich tea biscuit each evening
Month of Consultation: April

Muffin was obtained at 9 weeks of age from a breeder, being a house-rabbit from this age onward. He was litter trained relatively easily, although he will drop pellets around the house occasionally. His daily routine depends on whether there are people home, as he is kept in an indoor hutch rather than left in the house at these times. His owner feeds, grooms and gives Muffin his freedom from 5.30 onwards each day after returning home from work.

The client has sought advice because Muffin urinates on her and “no-one else”. He will also urinate and defecate on the sofa, and on the client’s bed. She has also seen him spray 2-3 times on the side of the sofa after being interrupted from urinating in his ‘usual spot’. In the presence of the owner he will usually visit the site 2 to 3 times before eliminating, the owner feels if she is not in the room he will do it immediately (NB: whether this is true is not known, the client leaves the room and on returning there is rabbit urine on the furniture. His behaviour preceding the event is unknown).

The most recent example of Muffin’s behaviour was during three hours of free time when the owner’s male flatmate was home. The rabbit went into her room for approximately 20 minutes and urinated and defecated on the bed. The previous incident occurred when the owner had Muffin on her lap. She was in a change of clothes as her mother’s rabbit had just urinated on her and Muffin climbed on her chest and “seemed to be searching for more rich tea biscuits”. He then urinated on her. In these situations the response is to shut Muffin away for 15 minutes.

Although Muffin urinated on his owner on the second day she brought him home (at the beginning of December), it stopped around Christmas. Muffin’s behaviour started again in February the most recent events were during April.

Differential diagnoses

It is possible that the lack of social interaction, or company in a gregarious species, particularly when there are unfamiliar scents entering the territory could cause Muffin a degree of stress. As a prey species rabbits are particularly susceptible to the effects of adrenal hormones. As well as physiological illness, behavioural effects of stress include anxiety that can cause over-vigilance and ‘over-reaction’ to fearful stimuli. Pain, unfamiliar surroundings, loud noise and proximity of predators can all cause stress responses in rabbits. Urination and defecation can both be behaviours that are seen during the ‘flight or fight’ response and this was considered as a possible cause of Muffin’s behaviour.

Physical examination prior to referral would have been expected to rule out many causes of pain including dental disease, spinal fractures or osteoporosis. As his surroundings have remained relatively stable, firework ‘season’ has finished and Muffin lives as a house rabbit in a flat with no other pets it is unlikely that his environment is causing him unreasonable anxiety. As Muffin can be held by the owner’s flatmate, and seems only to direct his toileting at objects that are associated with the owner herself, anxiety or fear of particular stimuli was considered to be unlikely.

Diagnosis

It is likely that Muffin is displaying normal behaviour in an inappropriate context. It seems to be related to either territorial marking behaviour or possibly an over-attachment or sexual bond to his owner. It is also likely that elements of both could contribute to this problem.

Case Two

Pet's name/s:	Sooty and Fluffy
Species:	Rabbits
Breed:	Dwarf cross
Sex:	Female – entire, Female neutered respectively
Age obtained:	9 weeks (approximately)
Previous Environment:	Pet Shop
Current Environment:	Hutch & Run with indoor access each evening.
Age:	6 months and 2 years respectively
Medical History:	Routine vaccinations & spay for Fluffy.
Diet:	Commercial mix and fresh vegetables.
Month of Consultation:	March

Fluffy was obtained about two years ago, along with her sister Dotty. Both rabbits lived in the same hutch and cohabited without any incidents. Unfortunately Dotty died unexpectedly at 18 months of age and the family wanted to obtain another companion for Fluffy.

Sooty was bought from a pet shop as a '6 week old male rabbit' and the initial veterinary check soon after he was purchased confirmed this. From the beginning the family kept Sooty in a separate hutch and worried that Fluffy was 'intolerant' of Sooty. They attempted to introduce the rabbits on neutral territory; this was the concrete area outside of Fluffy's hutch. Each time Fluffy would chase Sooty around the pen, apart from this the children felt that when together the rabbits interacted through a mutual tolerance of each other's company. In the preceding months Fluffy's chasing has become more frequent and Sooty has begun to defend herself aggressively. They will now fight on sight of each other. The children are very anxious about the behaviour but keen for the rabbits to interact. Observation found they would cry out and pull the harnessed rabbits apart if there was any interaction between them at all, anticipating the aggression.

Both daughters sometimes have trouble catching and handling the rabbits and were keen to improve their relationship with their pets.

Accurate observation and sexing established that Sooty was in fact female and if put in the concrete area adjacent to the hutches the rabbits would soon begin to interact, Fluffy usually chasing Sooty. Both rabbits were on harnesses and were separated at this point. When in a grassy run they were less interested in each other and grazed for around five minutes before passing each other in their feeding pathway. They were able to be distracted from each other with dandelion & strips of carrot.

Differential Diagnoses

As in other species, pain can result in aggressive behaviour. Dental disease or the formation of sharp hooks on the molars can be extremely painful and rabbits are also susceptible to developing painful musculoskeletal disorders such as arthritis or vertebral spondylitis. Whilst both rabbits had been referred as having no medical problems, further medical work up would be appropriate if the situation continued to deteriorate, or if the rabbits start to show physical signs of illness.

A learned pain association may have developed if either rabbit was experiencing musculoskeletal pain and was pulled away from the other rabbit whilst wearing the harness. The children's anxiety led them to pull the rabbits quickly away at the same time as they were investigating one another, which may have caused a conditioned fear response leading to aggression in future. If pain of this type was causing or contributing to the behaviour, it could be that the rabbits were being aggressive when handled or when anticipating handling in the hutch. At the time of consultation they were both able to be picked up, groomed, handled and harnessed without any defensive aggression or avoidance.

It is also possible that limited previous exposure to open spaces or nearby predators has caused agoraphobia in one or both of the rabbits. This type of phobic reaction undoubtedly causes a degree of stress that may lead to over-vigilance or a decreased threshold for aggression. As both rabbits were kept in a covered area adjacent to the house it was unlikely that nearby cats or birds of prey in overhead trees were causing their behaviour. Similarly both rabbits would graze outside in a run separately and Fluffy spent much time in the area when she was housed with her sibling.

Diagnosis

Most aggressive encounters in rabbits are intra-sexual with females tending to be the more aggressive sex. Sooty's gender was established wrongly at the end of the breeding season. This is a common mistake as at this time the testes regress into the abdominal cavity. Sooty was purchased in October, her aggressive responses to Fluffy were noticeable in around the beginning of February and have increased in frequency until the time of consultation, suggesting the aggression is due to intra-sexual competition related to the breeding season.

Conclusion

As with all companion animals, the treatment of behaviour problems is not available in a recipe-style format. This is particularly relevant in the field of rabbit behaviour, which is relatively new and the development of our understanding of this species and appropriate methods for behaviour modification is progressing rapidly. All behaviour practitioners, whatever the species they are treating, need a sound knowledge of its ethology, learning theory and its husbandry requirements to complement practical experience. This is also true for the rabbit. People often consider that these are 'easy to treat' animals, or can be treated using similar methods which have gained acceptance in the field of dog and cat behaviour modification. This is not the case and can lead to exacerbation of existing problems or the development of new ones.

Further Reading

Lockley, R.M. (1980) **The Private Life of a Rabbit** Book Club Associates

Magnus, Emma (2002) **How to Have a Relaxed Rabbit** Pet Behaviour Centre

McBride, Anne (1988) **Rabbits and Hares** Whittet Books

McBride, Anne (2000) **Why Does My Rabbit** Souvenir Press