



### Amber Foote FdSc RVN

Amber qualified from Myerscough College in 2017 and is furthering her qualifications to a BSc (Hons) in Veterinary nursing in the near future. She currently works at Veterinary Vision in Lancashire as Lead Veterinary Nurse. Although she enjoys all aspects of practice, she has a special interest in caring for wildlife, exotic species and medical nursing. Amber is particularly interested in standardising patient care across all species.

Email: [amberrosefoote@gmail.com](mailto:amberrosefoote@gmail.com)

# Evidence-based approach to recognising and reducing stress in pet rabbits

Amber Foote FdSc RVN 

NR Leyland, Croston, Lancashire PR26 9RN, UK

**ABSTRACT:** Rabbits, as a prey species, are very susceptible to stress and often disguise the signs. Registered Veterinary Nurses (RVN) must understand the natural behaviour of rabbits to be able to interpret signs of stress and to be able to implement techniques. This article aims to discuss the signs, causes and effects of stress in pet rabbits and how RVNs can address and educate owners on the health and welfare of their pet rabbit.

**Keywords:** rabbit behaviour; recognising stress; health and welfare

## Introduction

Rabbits are the third most popular pet in the UK; rabbit ownership has dramatically increased and continues to do so. With an estimated UK population close to one million pet rabbits, they are one of the most common animals offered for rehoming each year, often bought on impulse at a low price and without a thorough understanding of their health and welfare needs (PDSA, 2019). One of the biggest causes of poor husbandry is the ignorance of the animal's needs, an owner's obligations under the law are summarised in England and Wales by the Animal Welfare Act (2006).

Stress in rabbits is often caused by poor health and welfare standards, including inappropriate environment, lack of companionship and poor handling techniques. The RVN must understand natural behaviour and habits to be able to interpret signs of stress which may have a vast impact on the health and welfare of the patient (Mancinelli, 2016). RVNs play a vital role in addressing stress as they often provide environments, handling and client education, consequently, the RVN must understand the pathophysiological effects of stress to know why implementing changes to these areas benefits the patient (Wiseman & Benato, 2016). This article aims to discuss the signs, causes and effects of stress in pet rabbits and how RVNs can address and educate owners on the health and welfare of their pet rabbit.

## Main text

### Signs of stress

Rabbits, as a prey species, are very easily stressed via simple disruptions in routine and often disguise signs of pain and stress. There are a number of identifiable signs that a stressed or frightened rabbit will display; RVNs should be able to recognise and interpret these behaviours. Rabbits rarely use sound to communicate, but will use visual signs and body language to communicate with each other and us, this includes ear and tail position, gait and tension of the facial muscles (Magnus, 2009). A stressed rabbit will often display a crouched position close to the ground, with tense muscles and the head held flat to the ground (RSPCA, 2020). A stressed rabbit will also hold the ears wide apart and flattened against the back. It is important to note that in lop-eared rabbits, the use of ear movement as communication will be limited or potentially absent therefore, other methods of recognising stress should be used. The eyes are often wide with eyelids retracted and pupils dilated, most scared rabbits will still maintain eye contact however, a submissive rabbit will avoid eye contact. Breathing rate will be elevated, often with short, sharp breaths, and abdominal and leg muscles will be taut. A rabbit exposed to consistent stressors may become aggressive towards companion rabbits, owners or veterinary professionals; rabbits may bite people and often 'thump' their hind feet as an instinctive warning. Thumping,

tooth grinding, and grunting are some of the few sounds that rabbits make to alert other rabbits of potential danger; as a last resort rabbits can express an immense 'fear scream' which lets other rabbits know of the immediate danger.

However, as a prey species a stressed rabbit may not display these signs in an obvious manner and are able to hide signs of stress well. RVNs can use tools such as the RSPCA rabbit body language guide and the rabbit grimace scale (Keating et al., 2012; RSPCA, 2020) to determine signs of stress and pain. Some less obvious signs that owners may report include hiding, changes in activity, over-grooming and inappetence; these signs often lead to clinical conditions.

## Causes of stress

As noted in the PDSA Paw report (2019), 44% of pet rabbit owners had noticed and wanted to change at least one of their rabbits' behaviours, RVNs can help owners determine why their rabbit is displaying stress-related behaviours. There is evidence that there are a number of factors that can cause stress in pet rabbits including; inappropriate handling, inadequate environment, lack of companionship and exposure to unknown places or situations.

## Handling

It is generally accepted amongst veterinary professionals that handling can cause stress and it is known that rabbits do become stressed when handled above ground (Bradbury & Dickens, 2016). A number of studies have indicated that handling can be a stressful experience for rabbits and should be avoided unless there is a need to handle rabbits for their health and welfare such as veterinary visits and grooming (Bradbury & Dickens, 2016; Rooney et al., 2014; Schepers et al., 2009).

Rabbits are often bought as pets for children; children should be supervised when handling rabbits as they often pick them up incorrectly and without supporting the limbs. Young children should be supervised when interacting with rabbits and ideally all interactions should take place at ground level to reduce the risk of injury (Bradbury & Dickens, 2016). Fear aggression may develop through a lack of handling as a young rabbit or as a result of a bad experience during handling (Magnus, 2009).

Any unavoidable lifting can be made less stressful by educating veterinary staff and owners in appropriate methods of holding

rabbits during both consultations and inpatient care. A recent study by Oxley et al. (2019), showed that the negative impacts of handling can be minimised by handling them appropriately for their weight, breed and by avoiding tonic immobility and scruffing.

One of the most significant handling techniques that can cause stress is tonic immobility (TI), a reversible state of profound motor inhibition that can be induced in prey species (Varga, 2013). TI is a terminal defence mechanism used to limit injury when unable to escape and used to deceive predators (Bradbury & Dickens, 2016). TI should not be used in veterinary practice and owners should be discouraged from using this handling technique.

Bradbury and Dickens' (2016) literature review about rabbit handling had revolutionised the way veterinary professionals should handle and advertise rabbit health and welfare. Observing how veterinary professionals have less intrinsic ability to understand rabbit behaviour due to their sudden increase in population (Kernot, 2016). In terms of TI, the popularity of internet videos of rabbits under TI may suggest that this process is acceptable, it is the veterinary surgeon and RVN roles to ensure that owners are educated about the stress that TI can cause and why veterinary professionals will avoid it where possible (Bradbury, 2016).

Moreover, it is now accepted that lifting rabbits can also cause stress, as the only time in the wild where they would be lifted would be by a predator (Kernot, 2016). Veterinary professionals should avoid lifting rabbits by performing clinical examinations in the carrier on the floor; examination on the floor can reduce the risk of injury especially if the rabbit is known to be nervous and may try to jump from the handler's arms or from the table. Rabbits will often run towards their owner if nervous during examinations, the handler should have the rabbit facing away from the owner. If lifting is unavoidable then the paws and hind legs should be supported without touching the rabbit's paws; a towel may be useful to avoid direct contact and stress (Bradbury, 2016).

To help reduce stress pre-operatively veterinary professionals should aim to handle rabbits as little as possible, procedures can be grouped together to reduce the time spent handling the rabbit. Incorrect handling can lead to spinal fractures as rabbit's bones are fragile and are prone to vertebrae issues, several publications have noted that this commonly occurs during masked

inhalation and suggested that a towel is used to support all the limbs (Longley, 2010; Varga, 2013).

RVNs have a vital role in informing owners about the handling of their pet rabbits, historically, lifting and cuddling rabbits has been seen as an acceptable way to interact with them. However, an increasing body of evidence shows that incorrect handling is inevitably stressful, educating owners on good rabbit husbandry, discussing early socialisation and early handling will increase health and welfare for pet rabbits. Furthermore, rabbits are intelligent and playful animals, with patience and care they can be taught a variety of tricks and stress-free interaction can be encouraged. Owners should be advised to interact with their rabbit at ground level and allow the rabbit to approach in their own time. Rabbits can also be taught to go to and from their enclosure and carrier with clicker training and treats.

## Inadequate environment

Wild rabbits live underground in warrens with many junctions and several entrances, warrens are often well designed and maintained by a group of rabbits to protect the colony from predators. Stress-related behaviour problems can arise if a pet rabbit does not have an environment that allows them to express their natural behaviours such as burrowing, digging and hiding. Twenty five percent of rabbits are kept in inadequate housing conditions without the ability to exhibit normal behaviour patterns (PDSA, 2019).

The Rabbit Welfare Association and Fund (RWAFF) has an ongoing campaign called 'A hutch is not enough' and encourages veterinary professionals to discuss health and welfare standards during 'rabbit awareness week' which has been running successfully throughout UK veterinary practices for several years (RWAFF, 2020). The RWAFF advises that for a pair of average sized rabbits, a hutch with an overall area of 10 ft by 6 ft with a run height of 3 ft enables the rabbit to hop, stretch and stand on its hindlegs. It is also vital that rabbits have access to a secured area for exercise without risk from predators, the safe area should be available at all times and it needs to be big enough for a rabbit to take three hops in a single direction (RWAFF, 2020). Rabbit environments should allow for free movement, provide shelter, lookout places and burrowing opportunities (Yeates, 2017), a rabbit with a suitable environment should be able to express the following behaviours:

- Ability to hide or retreat if scared
- Ability to express foraging behaviours to gain food
- Ability to mark territory effectively with chin secretions, urine and faecal pellets
- Free from the presence of predators and unusual noises or smells

Many commercial rabbit hutches are based on floor size requirements set for laboratory animals, which are a minimum and do not allow rabbits to express the natural behaviours discussed (McBride, 2017). There are a number of behaviours a rabbit in an inadequate environment may express including; bar licking or chewing, pawing at corners of the cage, psychogenic polydipsia and excessive self-grooming (Boers, 2002). Extreme boredom can lead to over-eating, when combined with the inability to stand fully upright and exercise, rabbits can quickly become obese leading to a variety of other health issues (Makowska & Weary, 2016; Wiseman, 2019). Inadequate environments can also lead to territorial aggression both with the owner and between companions as the few items within the environment become high value to the rabbit.

### Lack of companionship

Wild rabbits live in large warrens which can house more than 100 rabbits, family groups often form up to fourteen members. Adult rabbits rarely leave the group, although young males may integrate into another group during the breeding season. It is natural for adult rabbits to protect the territory from rival groups although, during breeding season females within the group will fight to access nesting sites. This natural hierarchy and need for companionship are reflected in pet rabbits; evidence shows that rabbits greatly benefit from living in groups with companionship having a positive effect on their health, behaviour, emotional well-being and regulation of body temperature (Schepers et al., 2009; Seaman et al., 2008). Solitary rabbits have been shown to display depression-like behaviour and greater stress responses than rabbits with companions (Schepers et al., 2009). Companion rabbits are able to undertake mutual grooming which is a natural behaviour that encourages healthy relationships and emotional well-being. Furthermore, companion rabbits often share body warmth in cold temperatures, evidence indicates that solitary rabbits have significantly reduced body temperature (Burn & Shields, 2015).

Notably, 49% of UK pet rabbits live on their own yet only 18% of owners thought that their rabbit was lonely (PDSA, 2019). Keeping rabbits in solitary confinement has

welfare implications and should be avoided where possible; lone rabbits will be on 'high-alert' for predators and can become distressed without companions. Rabbits are social eaters and prefer the safety of a group when foraging, a lone rabbit may become inappetent which could lead to gastrointestinal stasis.

RVNs should advise owners to keep rabbits in pairs or small groups, a neutered male and neutered female is the best pairing and the least likely to fight. Neutered siblings are easy to keep together however, non-related rabbits can bond if introduced correctly. Neutered rabbits are most likely to live harmoniously, and owners should be encouraged to neuter their pet rabbit to reduce the incidence of aggression, unwanted litters and reproductive diseases.

### Veterinary visits

Rabbits are prey species and are easily stressed when placed in unfamiliar surroundings, as rabbits rarely leave their environment, visits to veterinary practice, groomers and moving homes can be inherently stressful. Although rabbits are the UK's third most popular pet, they are still under-presented in veterinary practice, 13% of rabbit owners did not provide any preventative healthcare and rabbits have a lower registration rate with a veterinary practice than cats and dogs (PDSA, 2019). Veterinary professionals should provide rabbit owners with information on how to keep veterinary visits as stress-free and encourage rabbit owners to make gradual but frequent visits from a young age. Owners should be shown how to and encouraged to groom their pet rabbits as visits to groomers can be stressful and can be avoided with consistent and appropriate grooming at home.

Rabbits, as with many other pets, can gradually associate carriers and car journeys with attending veterinary surgery (Riccomini 2009). Rabbits can be desensitised to their carrier by creating positive associations with treats and training. Desensitisation to car journeys may be possible by making short 'dummy runs' in the car and rewarding with treats. It is the role of the RVN to advise clients on safe transportation to help reduce stress; the client should be advised to use a safe top-opening carrier which can be strapped into the vehicle facing the direction of travel (RSPCA, 2011). If the client is walking to the practice, ensure the journey is short and the carrier is as stable as possible. Furthermore, any companions should travel with the patient to help reduce stress and prevent rejection when they return home.

RVNs are often involved in providing hospital environments and should aim to reduce stress in rabbits admitted for surgical or medical treatment by altering their environment (Varga, 2013). Rabbits should be hospitalised in a quiet area away from predator species, ideally, species-specific wards should be available to reduce stress in all patients (Ackermann & Aspinall, 2016). Rabbits will feel more secure if provided with a hide and bedding, if possible, the patient's companion should be housed too to reduce stress (Mancinelli, 2015).

### Physiological effects of stress

As identified, there are a number of factors that can cause physical and mental signs of stress in pet rabbits including; inappropriate handling, inadequate environment, lack of companionship and veterinary visits. Although, stress during handling and veterinary visits can be reduced, it cannot always be avoided therefore, RVNs should be aware of the physiological effects of stress.

An important response to stress that veterinary professionals should consider when caring for and anaesthetising pet rabbits, is the release of catecholamines. Catecholamines are hormones which control the body's physiological response to stress; stressful events such as veterinary visits, handling and environmental changes can all cause the release of catecholamines (Studdert, 2012). The release of catecholamines in a stressful situation are part of the fight-or-flight response; often increasing cardiac output, elevating blood pressure and glucose concentrations, reducing gut motility and overall increasing oxygen demand (Carrington-Brown & Walsh, 2016).

Moreover, stress in rabbits is known to cause physiological effects which can have complicated and life-threatening effects, the long-term exposure and effects of stress can lead to immunosuppression and a number of other disease processes (Harcourt-Brown, 2010). The immunosuppressive effect of stress can trigger clinical signs of infections that are latent in many rabbits such as *Encephalitozoon cuniculi* (*E. Cuniculi*), Pasteurellosis or enterotoxaemia. Exposure to stressful episodes such as inappropriate handling or veterinary visits are often followed by acute neurological symptoms of *E.cuniculi* such as head-tilts and seizures.

One of the most notable handling techniques that can cause stress in rabbits is

tonic immobility, handling in this way can increase blood glucose levels as high as 30 mmol/l which can lead to acutely painful conditions such as gastrointestinal stasis (Harcourt-Brown, 2010). In combination to this, the stimulation of the sympathetic nervous system during a stressful episode inhibits the activity of the gastrointestinal tract and reduces gut motility. In extreme cases of stress, rabbits can rapidly develop shock which is manifested by hypothermia, bradycardia, low blood pressure and ataxia (Harcourt-Brown, 2010).

## Conclusion

Rabbit ownership has dramatically increased and continues to do so; veterinary professionals are faced with an influx of pet rabbits presenting with physiological effects of stress due to poor health and welfare. There is evidence that there are a number of factors that can cause stress in pet rabbits including; inappropriate handling, inadequate environment, lack of companionship and exposure to unknown places or situations. Owners should be encouraged to implement the following points to reduce and prevent stressful experiences:

- Gradual and consistent interaction at ground level, allowing the rabbit to approach in their own time
- Avoid handling unless necessary and encourage clicker and treat training to and from enclosures and carriers
- Appropriate environment following the RWF guidelines, allowing free movement, shelter, warmth and freedom from predators
- Companionship for emotional well-being, warmth, mutual grooming and share of vigilant behaviours
- Gradual but frequent veterinary visits from a young age.

RVNs should aim to educate clients on the reasons why pet rabbits become stressed and the health and welfare needs of their pet. All veterinary professionals should aim to reduce stress in rabbits presenting in veterinary practice by ensuring safe transportation, stress-free handling techniques and providing appropriate environments during veterinary visits.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## ORCID

Amber Foote  <http://orcid.org/0000-0001-5670-1664>

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