

THE FORGOTTEN PET: AN UPDATE ON THE HEALTHCARE OF RABBITS

Rabbits are the third most popular companion pet after cats and dogs. A recent survey by leading UK animal charity, the People's Dispensary for Sick Animals¹ found that, although 2% of adults in the UK own a pet rabbit, the health and welfare of this animal still lag far behind those of cats and dogs, writes Bairbre O'Malley, Bairbre O'Malley Veterinary Hospital, Bray, Co. Wicklow

Rabbits form part of the order Lagomorpha along with hares. They are similar to rodents in that their teeth are rootless and continually growing (elodont). But, unlike rodents, they have tiny rudimentary teeth called peg teeth behind their upper incisors. They differ from hares in that they give birth to undeveloped young in burrows underground. The male is called the buck and the female is the doe. The young are called kits. All pet rabbits are descended from the European rabbit (*Oryctolagus cuniculus*) which came originally from the Iberian Peninsula (Spain and Portugal) and North West Africa. Traditionally, rabbits have been called 'children's pets' but they don't really make suitable pets for young families as they have a life span of eight to 12 years' so lose their novelty value as the kids grow older. Rabbits are also expensive to keep. The People's Dispensary for Sick Animals (PDSA) survey estimates the minimum lifetime cost of ownership of a pair of rabbits to be £6,500-£9,000 (sterling).

RABBIT BEHAVIOUR

Rabbits are a prey species, so much of their behaviour in the wild is related to escaping from predation. They feed at dawn and dusk (crepuscular) and live on tough fibrous grasses, weeds, roots and shoots and even bark in winter. They have highly developed muscular hindquarters which they use to thump their feet to alert other rabbits and sprint to the safety of their burrows when danger threatens. They are highly social and live communally in a warren where they dig a network of underground burrows. The use of a latrine area in the warren for toileting and scent-marking makes them very easy to house train as indoor pets. Wild rabbits also spend between 30% and 70% of their time above ground foraging and grazing. Reduced opportunity for foraging among captive rabbits has been associated with the development of abnormal and stereotypical behaviours.²

Many rabbit owners will probably have seen wild rabbits grazing in social groups and sprinting to the safety of hedgerows when alarmed. In spite of this, the PDSA 2018 survey found that some behaviours that owners would like to change in their pet rabbit included natural behaviour like thumping, digging and chewing. Owners need to be educated to provide their rabbits with enrichment objects such as tunnels, digging substrates and hiding places. Chewing-toy items should also be provided although – unlike cats and dogs that use these toys to play-hunt – rabbits will only play with toy items, if food is provided inside.

DIET

Rabbits are hindgut fermenters and use their vast caecum to ferment their food. They are herbivores and insoluble lignocellulose fibre forms an essential part of their diet. Lack of suitable fibre leads to lack of wear on the elodont incisors and molars causing dental disease and gut stasis. The diet of the pet rabbit should simulate the natural diet of rough grass and hedgerow weeds.



Figure 1: Rabbits should be allowed to graze outdoors, on grass, for exercise, foraging and vitamin D. A shelter or 'hidey hole' must always be provided.

If grass is not available, then plenty of good quality, long-strand meadow hay and fibrous leafy vegetables should be provided. Good quality hay is also particularly important for indoor rabbits with no access to outdoor sunlight as they could lack Vitamin D. Moderate amounts of extruded pellets (1-2 egg cups or 60g in total for a medium 2.5kg rabbit) can be fed daily but all muesli, cereal or seed-type mixes are contraindicated as they are too high in carbohydrate and low in fibre. Many owners buy convenience rabbit food from pet shops and supermarkets and, in the PDSA survey, it was found that 20% of rabbit owners still feed a muesli-mix diet to their rabbit. This can lead to multiple health problems in the form of dental disease, digestive issues and obesity, which is an increasing problem.

Three types of leafy greens should be offered daily and fruit should only be given as treats. In both USA and UK surveys of rabbit owners^{3,4} it was found that owners still feed treats in the form of yoghurt drops, nuts, bread/crackers, human breakfast cereals and biscuits. These should be avoided as high carbohydrate snacks cause gastric upsets and obesity. The best treats for rabbits are fresh herbs like parsley, mint, basil and coriander, as well as willow twigs or apple branches to chew on.

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ERAVAC[®] Inactivated vaccine, rabbit haemorrhagic disease type 2 virus (RHDV2), in injectable emulsion. **COMPOSITION:** Each dose of 0.5 ml contains: Inactivated rabbit haemorrhagic disease type 2 virus (RHDV2), strain V-1037 $\geq 70\%$ cELISA40*, (*) $\geq 70\%$ of vaccinated rabbits shall give cELISA antibody titres equal to or higher than 40. **INDICATIONS:** Rabbits: For active immunisation of rabbits from the age of 30 days to reduce mortality caused by the rabbit haemorrhagic disease type 2 virus (RHDV2). **ADMINISTRATION ROUTE:** Subcutaneous use. **DOSAGE:** 0.5 ml/animal. **SIDE EFFECTS:** Very common: a transient temperature increase slightly above 40 °C might occur between two or three days following vaccination. This slight temperature increase resolves spontaneously without treatment by day 5 post-vaccination. Very common: nodules or swelling (< 2 cm) can be observed in the injection site, which may last 24 hours. These local reactions gradually reduce and disappear without need for treatment. **WITHDRAWAL TIME:** 0 days. **SPECIAL PRECAUTIONS:** The vaccine provides protection only against RHDV2, cross protection against classical RHDV has not been demonstrated. Vaccination is recommended where RHDV2 is epidemiologically relevant. Vaccinate only healthy rabbits. Do not mix with any other veterinary medicinal products. Special precautions to be taken by the person administering the product: This veterinary medicinal product contains mineral oil. Accidental injection/self-injection may result in severe pain and swelling, particularly if injected into a joint or finger, and in rare cases could result in the loss of the affected finger if prompt medical attention is not given. Store and transport refrigerated (2 °C – 8 °C). Do not freeze. Keep the bottle in the outer carton in order to protect from light. Use product immediately after opening. Any unused veterinary medicinal product or waste materials derived from such veterinary medicinal product should be disposed of in accordance with local requirements. Keep out of the reach and sight of children. **FURTHER INFORMATION:** Onset of immunity: 1 week. Duration of immunity: 9 months demonstrated by challenge. Immunological properties: Vaccination of rabbits induced the production of hemagglutination inhibition antibodies that persisted for at least 12 months. Pregnancy: Laboratory studies in doe rabbits in the last third of gestation have not produced any evidence of a teratogenic, foetotoxic and maternotoxic effects. Pregnant does should be handled with special care to avoid stress and risk of abortion. **PACKAGING:** 10 vials of 1 dose, 1 vial of 10 doses, 1 vial of 40 doses. **MARKETING AUTHORISATION NUMBER(S):** EU/2/16/199/001-002-003. **MARKETING AUTHORISATION HOLDER:** HIPRA S.A. Avda. La Selva, 135, 17170 Amer (Girona), SPAIN. Under veterinary prescription. Use medicines responsibly. **LEGAL CATEGORY:** POM-V.w

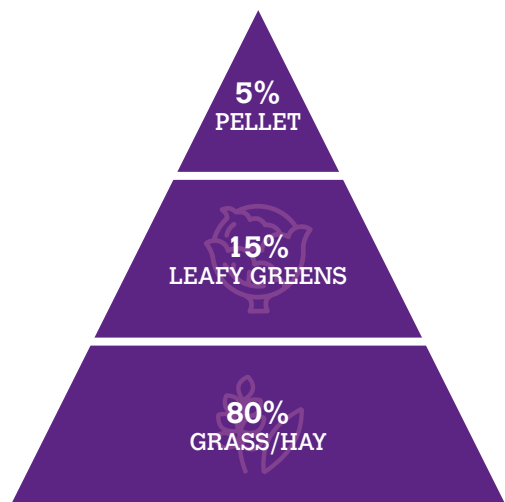
HIPRA UK AND IRELAND

Foxhall Lodge, Foxhall Road
NG7 6LH Nottingham
United Kingdom

Tel. (+44) 0115 845 6486
ukandireland@hipra.com
www.hipra.com

Rabbits can drink as much as a 10kg dog (eg. Jack Russell terrier) so plenty of water must be provided for them. Rabbits prefer to drink from a water bowl¹⁵ but always provide a water bottle as well in case the bowl gets tipped over.

Table 1: Rabbit food pyramid. Current guidelines are to feed at least 80% grass/hay; 15% leafy greens/vegetables; and less than 5% extruded pellet food.



DID YOU KNOW?

Rabbits, being a prey species, have laterally placed eyes, so they have an almost 360-degree field of vision to spot danger. They have a blind spot in front of their nose and mouth so they can never actually see what they are eating! The smell and texture of the food provided is, thus, more important than its colour and appearance. Muesli-type mixes are often brightly coloured and look attractive to the human palate but are not suitable for rabbits.



Figure 2: In 2018, the PDSA survey found that 20% of owners still feed their rabbits muesli cereal mix, which causes various health issues.

ENVIRONMENT

All housing must allow rabbits to live in an environment that meets their physical, social and behavioural needs. Their basic welfare needs include the ability to run, jump, graze, dig, rest and stand up on their hind legs without their ears touching the roof. The PDSA Survey 2018 found that 61% of rabbits live predominantly outside, while 39% live predominantly inside.

Unfortunately, when asked to choose an image that most closely resembled where their rabbit lived, 28% of UK rabbit owners revealed inadequate housing provision – either a small, outdoor hutch (16%) or a small, indoor cage (13%).



Figure 3: Keeping pet rabbits in small hutches is contraindicated on welfare grounds.

OUTDOORS

Rabbits have traditionally been a valuable food source, so hutches were designed to fatten them for food consumption. Keeping rabbits in small hutches is now contraindicated on welfare grounds and akin to battery hens. Pet rabbits kept outside need, at least, a large two-storey hutch with either a large, grazing pen or outdoor area for exercise and forage time. A leading UK rabbit charity, Rabbit Welfare Association and Fund (RWAFF) stipulates that hutches should be no smaller than 6ftx2ftx2ft with an exercise pen of minimum 10ftx6ftx3ft.⁶ The hutch should allow the rabbit enough room for the rabbit to stand up on its hindquarters and to take three hops. As rabbits are fearful of open spaces, tunnels and shelter must always be provided as substitute burrows. All outdoor pens must be safe against attack from predators like dogs and foxes and 'hidey-holes' should be provided against aerial stress from birds of prey and to offer shade from direct sunlight.



Figure 4: In the wild, rabbits dig underground burrows in communal warrens.

HOUSE RABBITS

As they are a sociable species and need plenty of exercise, the best option is to keep pet rabbits in the house as has been

the trend in North America for many years. In a survey of 959 US rabbit owners in 2017, only 1.2% of rabbits live permanently outside.³ Ideally, house rabbits should also have free-range garden time for exercise, vitamin D and natural foraging. Rabbits can be easily house-trained to use a litter tray. Cat litter should be avoided as they will eat it but wood pellets or a deep tray with newspaper and plenty of hay can be used. If the rabbit is free range in the house, they must have a small pen or hidey hole where they can bolt when danger threatens. As herbivores, they will be tempted to eat any greenery so remove all toxic household plants. It is natural for them to chew through roots while burrowing so they are attracted to nibble on low-lying electrical wires – most rabbit owners complain about the loss of their mobile phone chargers! Hay must be provided, even in the house, and hay racks can be useful. Rabbits do not like high temperatures and should be kept in a cool part of the house. A warm, humid atmosphere predisposes to respiratory disease. The optimum temperature range is between 15-21°C.⁷

HANDLING THE RABBIT

Rabbits have a lightweight skeleton and powerful heavy hind musculature designed for sprinting. In one species, the New Zealand White, the skeleton accounts for just 6%, while the muscles total 56% of body mass.⁸ This means that, if the spine is unsupported when handling nervous rabbits, they can kick out with their hind quarters and fracture their spine, usually L6-7. Although young rabbits can be trained to tolerate it – handling and cuddling are not natural traits for a prey species – being lifted off the ground in the wild usually means they are somebody's dinner. Owners, and especially children, must be shown how to handle their rabbit, providing support at all times to the spine.⁹ Wrapping them in a towel ('bunny burrito') is a useful method of restraint for procedures like nail clipping.



Figure 5: In 2018 the PDSA survey found 54% of UK rabbits still live alone.

COMPANIONSHIP

Rabbits need company yet, sadly, the 2018 PDSA survey revealed that over half the rabbits (54%) in the UK are still living alone. In the past, rabbits were often sold with a guinea pig to minimise the chance of unwanted litters. Humans and guinea pigs are not an adequate substitute – the best

companion for a rabbit is another rabbit.

Companionship is important for warmth via huddling (if outdoors), exercise and emotional health. Their instinct is 'safety in numbers' so rabbits, in company, are more confident. They will also graze more on grass and take more exercise – the more eyes in the group the safer they feel! Mutual grooming also means rabbits, in company, have better eye health. This is because rabbits love to lick each other around the eyes preventing the build up of ocular discharge and, thus, eye infections.

Although it is encouraged to keep rabbits together time needs to be allowed for them to become accustomed to each other as like humans some just don't get along! Younger neutered rabbits usually socialise fast, but it can take time to bond adult rabbits. The best combination is a castrated male and spayed female introduced to each other in neutral territory.



Figure 6: Rabbits need companionship for warm, confidence and mutual grooming and feeding.

NEUTERING

Routine neutering is recommended for both the male and female. Bucks are neutered to avoid unwanted litters, hypersexual behaviour, spraying the walls like a tom cat and aggression towards other rabbits. They can be neutered from four months old or as soon as the testicles are descended. Females need to be spayed to prevent pregnancy and pseudopregnancy. They can become territorially aggressive and will sometimes lunge at and bite their owner when their cage door is opened. They can also develop uterine adenocarcinoma from two years of age. This is a slow-growing tumour – local invasion occurs early in the disease but metastasis to lungs, liver, adjacent viscera and bones take one to two years. In one post-mortem survey of 854 entire female rabbits, the prevalence of uterine neoplasia was <3% in rabbits under three years of age but affecting 48.1% of rabbits under seven years of age.⁹ The clinical signs are bloody vaginal discharge, cystic mammary glands and decreased fertility. The best time to neuter females is from five to eight months! Under five months, the immature uterus can be threadlike and delicate, and over eight months, the doe will have laid down large fat deposits in the mesovarian and mesometrium making surgery more vascular. Neutering is not a solution to aggression caused by

boredom, rough handling and fear. Just as with puppies, rabbits need to be given plenty of attention from an early age, so they become accustomed to being gently handled.

RABBIT HEALTHCARE

The PDSA 2018 survey showed that 34% of rabbits were not currently registered with a vet. Rabbits, being prey species, seek to appear inconspicuous so do not show signs of ill-health readily – many suffer in silence, with painful teeth for example. For this reason, it is recommended that all rabbits visit an experienced rabbit vet every six months.



Figure 7: Rabbits being a prey species do not enjoy being handled or cuddled.

The survey also found that nearly half (49%) of rabbits in the UK had not been vaccinated with a primary course when young and 58% had not had regular booster vaccinations. Top reasons given for not vaccinating include that the rabbit doesn't come into contact with other animals (28%), that it's not necessary (20%) and that it's too expensive (13%).

CURRENT VACCINATION PROTOCOL

Vaccination is against myxomatosis and two strains of rabbit viral haemorrhagic disease (RVHD) – type 1 and 2. All rabbits, both indoor and outdoor, must be vaccinated as these infections are not just spread by direct contact but also by insect vectors and fomites.

MYXOMATOSIS

This is a poxvirus, which is spread by insect vectors like the rabbit flea (*Spilopsyllus cuniculi*), and cat flea, as well as biting flies and mosquitoes. The virus has an incubation period of one to three days and, in the acute form, death ensues within 10 days, usually due to secondary lung infection with pasturella. A chronic nodular form causing cutaneous 'pseudo tumours' has a 50% survival rate and is worth treating. Clinical signs are oedema and cutaneous skin proliferation of the nose, eyelids and genitals. The chronic form causes 'myxoma' nodules on ears, nose and paws.

PREVENTION

This involves control of insect vectors, especially fleas. The virus can last 105 days on the flea without access to rabbits. In high-risk areas, hang an insecticide strip/mosquito netting near the hutch and keep wild rabbits from the garden. Nobivac Myxo-RHD vaccination confers immunity against

both myxomatosis and RVHD-1. It contains live attenuated myxoma virus strain with an RVHD virus VP60 capsid gene insert. It is given subcutaneously every 12 months starting from five weeks of age.

RVHD VIRUS 1

RVHD virus 1 (RVHD-1), a calici virus, was first reported in China in 1984 and reached the UK in 1992. It is a peracute disease causing sudden death in unvaccinated rabbits over two months of age. The acute form causes muscle tremors, tachypnoea, convulsions and death within one to two days. Bleeding from the body orifices is common. Signs occurred so rapidly that infected rabbits were rarely seen alive by veterinary surgeons but were reported mostly as a phone call from distraught owners finding a dead pet rabbit. Post-mortem signs are hepatic necrosis and haemorrhage from body organs. It is a highly contagious disease with an 80-90% mortality with no treatment in affected rabbits. Prevention is by the combined Myxo RHD vaccine available as above. The disease is spread via direct contact with infected rabbits, urine and faeces, via fomites (clothing, shoes, contaminated feed, cages, bedding) the wind or insect vectors like flies, rabbit fleas and mosquitoes. Predators can also excrete the virus through their faeces (dogs, foxes). The virus can also survive up to seven months in the environment.

RVHD VIRUS 2

A new variant strain of RVHD virus 2 (RVHD-2) was identified in France in 2010. In 2015, cases were confirmed in the UK and in October 2016, there were confirmed cases in southern Ireland. The source of this virus variant is likely the wild rabbit population and it most likely spreads in the same way as RVHD-1.

As RVHD-2 has a lower mortality of 5-70%, cases may be brought to the vet that involve symptoms like unexplained bleeding, bruising, lethargy, fever, loss of appetite and weight loss. The main difference between RVHD-1 and RVHD-2 is that the virus can affect even young rabbits under two months of age. Not all rabbits in a group will necessarily be affected equally and some in-contact rabbits may not develop any signs of disease. Milder cases can also recover with intensive veterinary care.

Eravac inactivated vaccine is licensed and available in southern Ireland. This is available in single and multidose vials and is given subcutaneously between the shoulder blades. As it does not confer immunity against myxomatosis, it needs to be given in addition to the standard Nobivac Myxo/RVHD-1 and there needs to be a two-week interval between the vaccines. This vaccine can be given to any rabbit at least 30 days old and onset of immunity is one week post-vaccination. Current data sheets recommend giving the vaccine every nine months, but recent vaccine challenge trials have proven that the vaccine lasts 12 months.

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Table 2: Rabbit welfare action plan.

