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Catherine began her career at an early age and started her training with animals in 1994. She qualified as an RVN in January 1999. She has always had a particular interest in rabbits, and has rescued a few of her own over the years. She completed my City & Guilds Certificate in Nursing Exotic Species in 2002.

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# Infectious diseases in rabbits

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**ABSTRACT:** This article aims to highlight the various infectious diseases that domesticated rabbits may face in their lifetime. Without early treatment or vaccination, some of these diseases can be fatal. It is vital that we, as veterinary professionals, are confident and able to educate owners to ensure that they maintain good husbandry and health for their companions in order to maximise their lifespan.

There are many infectious diseases that rabbits can contract. Vaccination can prevent some of them. However, there are other infections that can occur that will require prompt veterinary treatment. Early detection and treatment in a rabbit increases the chances of a good response and return to normality in most cases. Good husbandry and hygiene play a paramount role when dealing with sick animals.

### Guidelines to good husbandry

- Regular veterinary examinations
- Appropriate nutrition - consisting mostly of hay (85-90%) (Buseth and Saunders, 2015). This can then be supplemented with fresh vegetables and a small amount of dry food (**Figure 1**)
- Suitable living environment and exercise area
- Good hygiene – regular cleaning and disinfection of the living environment, feeding accessories, blankets and toys
- Regular interaction and handling – this will make you more aware when something is wrong

### Guidelines to disinfection and hygiene protocols

- Use a suitable broad-spectrum virucidal, bactericidal and fungicidal, eg. Virkon®
- Clean the environment regularly including feeding accessories, blankets and toys
- Fresh hay, vegetables and dry food daily
- Fresh bedding regularly
- Wash hands after cleaning and handling
- Wear gloves and aprons especially if dealing with infectious patients

The most common infections in rabbits are

#### 1. Myxomatosis

2. Viral haemorrhagic disease/rabbit haemorrhagic disease (VHD/RHD) 1
3. Viral haemorrhagic disease/rabbit haemorrhagic disease (VHD/RHD) 2
4. Respiratory infections – upper and lower respiratory tract infection
5. Diarrhoea – *Escherichia coli* (*E. coli*) and coccidiosis
6. *Encephalitozoon cuniculi* (*E. cuniculi*)
7. Syphilis

Some of the clinical signs to be aware of that will indicate a rabbit is feeling unwell include the following:

- Depressed/quiet
- Anorexic/inappetent
- Not as interactive
- Polydipsia
- Diarrhoea
- Bloated abdomen
- Lack of faecal droppings
- Head tilt
- Increased/decreased respiratory effort and/or rate
- Sneezing
- Nasal discharge
- Hunched posture
- Tooth grinding (sometimes a sign of pain)

\*\*please note: rabbits cannot vomit\*\*

## Myxomatosis

Myxomatosis is a myxoma virus (a type of pox virus) that only affects rabbits. It is highly contagious and usually fatal in unvaccinated rabbits (around 90%) (Faulkner, 2015). On rare occasions rabbits can survive this virus, but their recovery is dependent on the virulence of the strain and of course the rabbit's own

Table 1. Summary/quick reference guide (Harcourt-Brown, 2017a; Rees Davies, 2006; Meredith, 2006a, b, c)

Infection	Incubation	Clinical signs	Vaccine
Myxomatosis	8–21 days	Oedema around eyes, ears and genitals	YES
		Death usually occurs within 14 days	From 5 weeks, repeated annually
VHD/RHD 1	16 hours–3 days	Often presented dead	YES
		Rare to see clinical signs	From 5 weeks, repeated annually
		Epistaxis (nose bleed)	
		Death can occur within 12 hours	
VHD/RHD 2	3–9 days	Rare to see clinical signs	YES
		Inappetance, lethargy, weight loss, jaundice	4–10 weeks, repeated every 6–12 months thereafter
		Death can occur within 5 days	Leave a gap of 2–3 weeks between vaccine types
Respiratory	Variable	Upper: nasal discharge, sneezing	NO
		Lower: anorexia, depression, dyspnoea and cyanosis	VACCINE
Diarrhoea ( <i>E. coli</i> and coccidiosis)	Unknown	Diarrhoea, lethargy, bloated abdomen, collapse	NO
		Sudden death is possible	VACCINE
<i>E. cuniculi</i>	Unknown	Head tilt, hind limb paresis, retarded growth	NO
			VACCINE
Syphilis	3–6 weeks	Crusting/ulcerative skin around genitals, nose and eyes	NO
			VACCINE

immunity. These patients will require intensive nursing care. Environmental temperatures can also affect mortality rates and colder conditions are likely to cause more fatalities. The virus is transmitted by biting insects, such as fleas and mosquitos. It can also be spread by *Cheyletiella* fur mites. The incubation for this disease is 8–21 days (Keeble, 2006) (this is the moment of exposure to the



Figure 1. Balanced rabbit diet



Figure 2. Ocular oedema caused by myxomatosis

onset of clinical signs). The virus causes severe oedema around the eyes (Figure 2), ears, nose (Figure 3) and genitals (Figure 4). The swelling can be severe enough to close the eyelids together, affecting the rabbit's vision. Rabbits are obligate nasal breathers so when the oedema occludes the nares it is very distressing for them. Appetite and grooming abilities are also affected when the nasal cavities are occluded. Rabbits deteriorate and lose condition rapidly with this virus.

The current prevention for this almost invariably fatal virus is a yearly vaccination with Nobivac® MYXO-RHD given by a single subcutaneous injection from as early as 5 weeks of age. Immunity takes 3 weeks and the vaccine must be given annually to maintain protection against this virus. According to safety guidelines, it is recommended that female rabbits (does) are not vaccinated during the first 2 weeks of pregnancy. There has been no safety studies carried out on reproductive performance; therefore, it is recommended that breeding males (bucks) are not vaccinated (Noah Compendium, 2016).

### Viral haemorrhagic disease or rabbit haemorrhagic disease (VHD/RHD) 1

VHD is a calicivirus and attacks all organs including the lungs, liver and GI tract. The onset of the virus is rapid and you very rarely see any external symptoms. Transmission is either by direct contact of secretions between rabbits or indirect contact on contaminated food and bedding.

The virus causes internal haemorrhage and sudden death occurs in 90% of cases (Harcourt-Brown, 2017a). It would appear that rabbits less than 4 weeks old have a natural immunity to this virus which wears off after 4–6 weeks. If exposed during this period then lifelong immunity is possible (Harcourt-Brown, 2017a). There is no cure for a rabbit once it has contracted the virus; however, there is a vaccine that prevents the disease. The vaccine is called Nobivac® MYXO RHD – it is a combined prevention that protects the rabbit against VHD and myxomatosis. It is given annually by a single subcutaneous injection and can be given from 5 weeks of age.

### Viral haemorrhagic disease or rabbit haemorrhagic disease (VHD/RHD) 2

This is a recently identified strain and is a mutation of the original calicivirus VHD 1. It is just as contagious, similar to that of the first strain; however, it can be less fatal (5%–70% with an average of 20%) (Harcourt-Brown, 2017a) if identified and treated promptly. It affects rabbits of all ages. Clinical signs are rare, but can include lethargy, inappetance, weight loss and jaundice. As with VHD 1, the virus remains active on fomites for several months, longer in colder weather. The vaccination for VHD 1 is not effective for VHD 2. There is a vaccine (off licence) available currently in the UK in single-dose vials but it currently requires a SIC (Special Import Certificate) available through the VMD (Veterinary Medicines Directorate): it is Filavac® VHD K C+V (France) (Harcourt-Brown, 2017b).



Figure 3. Nasal oedema caused by myxomatosis

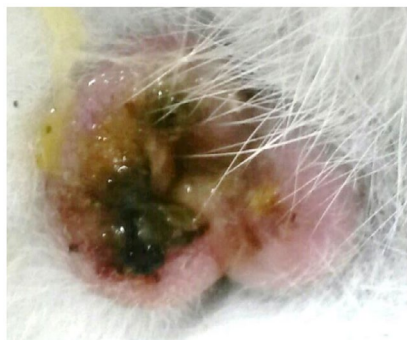


Figure 4. Genital oedema caused by myxomatosis

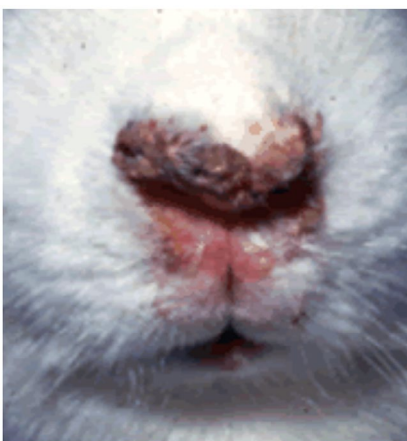


Figure 5. Nasal lesions caused by syphilis. Courtesy of the University of Missouri: <http://dora.missouri.edu/rabbits/venereal-spirochetosis-rabbit-syphilis-vent-disease-cuniculosis/>

The vaccine can be given to rabbits as early as 4 weeks old, but a second dose must be given at 10 weeks to complete the primary course. Booster doses are then required every 6–12 months depending on risk areas.

## Respiratory tract infections – upper and lower

Respiratory infections are common in rabbits and highly contagious. Over 50% of cases are caused by *Pasteurella multocida* (Rougier *et al.*, 2006); however, other pathogens such as *Bordetella bronchiseptica*, *Pseudomonas* spp. and *Staphylococcus* spp. can also be the cause. Rabbits are obligate

nasal breathers so infections affecting the lower or upper respiratory tracts can be quite distressing for them. Upper respiratory tract infections (commonly referred to as ‘snuffles’) (Harcourt-Brown, 2002) usually present with nasal discharge and sneezing, whereas lower respiratory tract infections present with anorexia, depression, dyspnoea and cyanosis. Coughing in rabbits is rare. Respiratory infections can be transmitted in aerosol droplets, direct contact or on fomites such as bedding, feeding bowls, etc. Many rabbits can be carriers of a respiratory infection and show no signs of ill health and are therefore classed as subclinical; however, any kind of stress can trigger the infection at any point. Stress triggers can include poor husbandry (increased ammonia levels from urine), overcrowding, bullying, malnutrition and transportation, along with any other disease that may cause lowered immunity.

## Diarrhoea – *E. coli* and coccidiosis

Diarrhoea is not a common condition in older rabbits; however, it is seen in younger rabbits that have underdeveloped gut flora and therefore reduced protection against bacterial pathogens. It can be quite devastating for them and can often result in death due to the enterotoxins that build up because of the rapid bacterial multiplication. *E. coli* and coccidiosis are the most commonly seen in these situations (Rees Davies, 2006). The rabbit will usually present with diarrhoea along with collapse. They can sometimes just appear bloated with gastrointestinal stasis after bouts of diarrhoea. They dehydrate rapidly and become hypovolaemic. On occasion, the toxic shock alone can cause sudden death in a short space of time.

## *Encephalitozoon cuniculi* (*E. cuniculi*)

This is a protozoal parasite that can cause inflammation/granuloma formation on the liver, kidneys, central nervous system, lungs and heart. Clinical presentation can include head tilt, hind limb paresis and retarded growth. Around 50% of rabbits have been exposed to or are currently infected with this protozoan (Vets Now, 2017). The parasite is transmitted via contaminated food, in urine, inhalation and transplacentally. Spores in the environment can last more than 4 weeks in temperatures above 22°C (Harcourt-Borwn, 2002b), but equally can be easily destroyed with disinfection, boiling or autoclaving (Keeble, 2006).

*E. cuniculi* is zoonotic, and although it is known to be the same strain that infects

humans, there is no report as yet to confirm that a human has contracted it from a rabbit (Keeble, 2006).

## Syphilis

Rabbit syphilis is a bacterial disease caused by the spirochete *Treponema cuniculi*. Transmission of the disease is by mating, parturition or through the doe’s milk to her kits; therefore, it is more commonly seen in breeding rabbits and their litters. Incubation time is lengthy and some rabbits can be asymptomatic for years until something triggers the disease, such as a stressful situation or contracting another illness that potentially can suppress the immune system. This is not a zoonotic condition. If a rabbit has syphilis, they are likely to develop lesions around the perineum, nose (Figure 5) and lips. The lesions start off being red and oedematous to ulcerative and scabbing.

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