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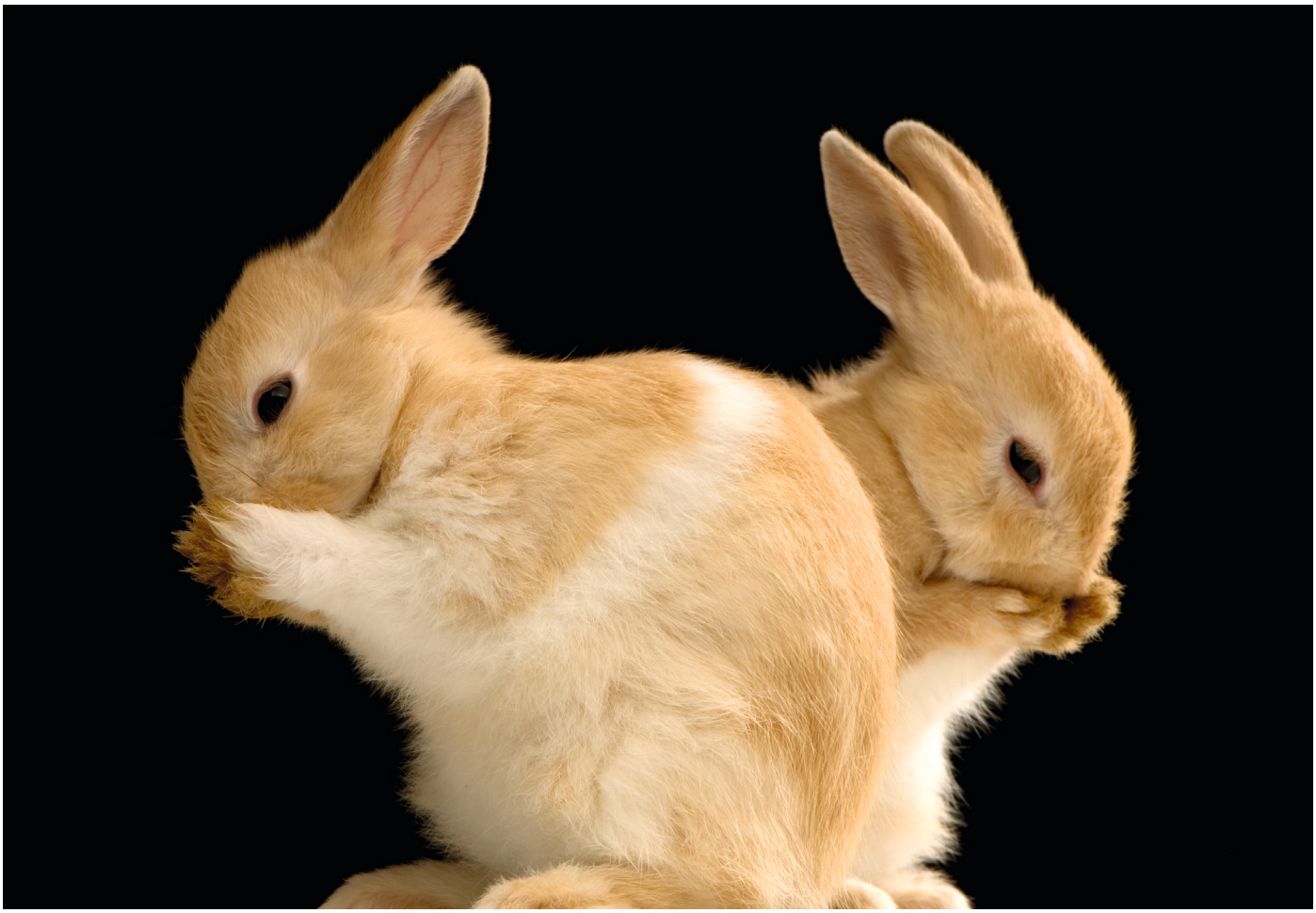
Selected infectious diseases in rabbits – what is feasible, what is important?



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Diagnosing infectious diseases in rabbits is not always easy. For one thing, rabbits show clinical signs rather late and for another, there is often a time delay before they are presented to the veterinarian. Especially the diagnostic workup of infectious diseases with non-specific signs is a challenge for the practitioner. The first step is a detailed clinical history. Here, it is necessary to ask about how the animal is kept (individually or in a group), its age, vaccination status and any unusual occurrences. A thorough clinical examination and a general blood test are just as essential as the laboratory diagnosis of the infection itself. Sample material and detection methods depend on the suspected infection.

Below, some selected infectious diseases with non-specific, respiratory and/or mainly gastrointestinal signs are described in more detail. For the sake of clarity, the most important facts are presented in tabular form.

Infections with non-specific signs

In patients with non-specific signs such as apathy, lethargy and anorexia or in cases of sudden death, it is often difficult to associate them directly with a specific infectious agent. Common lethal infectious diseases in this category are rabbit haemorrhagic disease (RHD) and tularaemia.

Tularaemia

Even though tularaemia is rare, recent cases in Germany and its zoonotic potential keep putting it in the spotlight again and again. Tularaemia, also called “rabbit fever”, is a notifiable bacterial zoonosis (causative agent Francisella tularensis). The main reservoir in Germany are European hares. Yet, rabbits, rodents, squirrels and wild ruminants can also be infected.

Despite its low incidence in humans (17 – 72 cases per year in Germany) [1]), tularaemia is also notifiable in humans (§ 7 par. 1 German Infection Protection Act) and is considered an occupational disease of hunters and persons who trade in hares or process them into food products [1]. Because of the low infectious dose of 10 – 50 (!) pathogens, the severe course of the disease in some cases and good chances of recovery if treatment is started early in humans, detection should be performed soon if there is any suspicion. Infection of humans occurs via the oronasal route, the conjunctiva or via lesions of the skin or the mucous membrane. Sources are evisceration of carcasses, contaminated, insufficiently heated food, contaminated water, aerosols as well as bites/stings of arthropods (ticks, mosquitoes, horseflies). Typical clinical symptoms in humans include: non-specific, flu-like symptoms, skin ulcerations, swollen and suppurative lymph nodes, fever, conjunctivitis and pneumonia. Aminoglycosides, fluoroquinolones, tetracyclines, chloramphenicol or rifampicin are recommended for treatment [2]. Prophylaxis in humans includes: avoiding unprotected contact with wild animals, maintaining occupational hygiene when handling sick or dead wild animals and game, only eating game dishes which are well cooked.

Table 1: Fact sheet tularaemia in rabbits and hares [1, 3 – 5]

Tularaemia	Data and facts
Causative agent	• *Francisella tularensis*, family *Francisellaceae* (y-proteobacteria) • gram-negative, non-motile, pleomorphic bacillus • host range: mainly hares (reservoir: rodents and others); **Zoonosis! Notifiable!**
Infection	incubation period: 3 – 5 (14) days [2, 3] • biting insects, ticks
Shedding	• secretions and excretions • vector: ticks (can host for months, pathogen multiplication and transovarial transmission [4]), horseflies, mosquitoes
Clinical picture	mild – lethal • acute course: apathy, fever, tachypnoea, ruffled fur, loss of shyness, swollen lymph nodes, diarrhoea, vomiting, dyspnoea, sepsis [1] • chronic course: emaciation, spleen abscesses, liver abscesses [5]
Course	• mild to severe (lethal), death usually after 2 – 13 d due to sepsis
Diagnosis	• suspicion: clinical picture and history: contact to the “wild animal” • **direct pathogen detection by PCR:** EDTA blood, swab, lymph nodes, spleen • pathological examination
Treatment	none, killing!
Prophylaxis	• high tenacity (0 – 10 °C: weeks, < 0 °C: months) • easy to kill with bactericidal disinfectants (RKI list, VAH list) • there is no vaccine approved in Europe

Infections with respiratory signs

Respiratory signs, such as sneezing, coughing, nasal and ocular discharge and, above all, dyspnoea, occur when there are disorders in the upper and/or lower respiratory tract and inflammatory changes in the non-respiratory area that impair gas exchange. The causes are manifold. Apart from cardiological, traumatic, degenerative and/or neoplastic changes, infections are the most frequent cause.

Snuffles (Rhinitis contagiosa cuniculi)

Snuffles is one of the most common reasons why rabbits are presented in practice.

"Snuffles" is a globally spread, age-independent, predominantly bacterial mixed infection of the upper and sometimes lower respiratory tract. Many rabbits are asymptomatic carriers. In times of immunosuppression, triggered by stress or other underlying diseases, it may become clinically apparent. In addition to changes in husbandry and inadequate housing conditions, breed-related factors such as brachycephaly can also lead to an increased incidence [6]. *Pasteurella (P.) multocida and Bordetella (B.) bronchiseptica*, for example, are considered to be co-pathogens of snuffles but, just like mycoplasmas [7, 8], are also often found in the upper respiratory tract of healthy rabbits [16]. Infections with *P. multocida* typically cause rhinitis with mucopurulent nasal discharge, but can also manifest as otitis, conjunctivitis, pneumonia, abscesses, genital infections and septicaemia [9]. Because of their wide host range, both *P. multocida* and *B. bronchiseptica* are said to have a certain zoonotic potential and thus pose some risk to immuno-compromised people or children [10, 11].

Table 2: Fact sheet snuffles [6 – 7, 12 – 13]

Snuffles	Data and facts
Causative agent	manifold, depending on stock and husbandry: • Hein et al. 2021: 32% *Pasteurellaceae*, 28% *Enterobacteriaceae*, 13% *Pseudomonaceae*, 12% *Staphylococcaceae* [12] • Villa et al. 2001: 43% *Mycoplasma* spp., 39% *Bordetella bronchiseptica*, 14% *Pasteurella multocida*, 14% *Chlamydia* spp., 10% *Staphylococcus aureus*, 6% *Escherichia coli* [7] • Rougier et al. 2006: 55% *Pasteurella multocida*, 52% *Bordetella bronchiseptica*, 28% *Pseudomonas spp.*, 17% *Staphylococcus spp.* [13]
Infection	• oronasal, airborne
Shedding	• respiratory secretions
Clinical picture	• uni- or bilateral nasal stridor; sneezing; watery, later mucopurulent nasal discharge; sticky front paws; varying degrees of dyspnoea • imparied drainage and ascending infections → conjunctivitis, otitis media/interna partly with vestibular syndrome [14]; encephalitis • severe courses → pneumonia and sepsis
Course	• mild to severe depending on the pathogen
Diagnosis	• nasal lavage sample - from the deeper parts of the upper respiratory tract (to avoid contamination with intestinal/ environmental pathogens) - clean the rhinarium with an alcohol-soaked swab - lavage sample collection with physiological saline solution using a 2- to 3-ml syringe and attached intravenous cannula - lavage sample of the nasolacrimal duct in case of dacryocystitis • **bacteriological examination:** lavage sample/swab in tube with medium • **PCR** (*Mycoplasma spp.*): lavage sample in sterile screw cap tube without medium
Treatment	• depending on pathogen/antibiogram, mucolysis, immunostimulation
Prophylaxis	• improving husbandry and housing conditions (excessively dry air due to heating in winter, draughts, lack of hygiene) [6]

Infections with gastrointestinal signs

Diarrhoea is a common problem in rabbits. In addition to dietary causes, it often results from infections with endoparasites. Apart from clinical history and clinical examination, faecal examination is indispensable for workup!

Coccidiosis

Coccidiosis is an infection caused by protozoa which is associated, to some extent, with high mortality rates, especially in young animals (see Table 3).

Table 3: Fact sheet coccidiosis [15, 16]

Snuffles	Data and facts
Causative agent	• genus *Eimeria (E.)*, protozoa • intestinal coccidiosis: more than 25 different species of *Eimeria*, especially *E. intestinalis, E. magna, E. media, E. perforans* [15, 16] • hepatic/bile duct coccidiosis: *Eimeria stiedai* • host-specific and non-specific species
Infection	• peroral intake of oocysts (contaminated water, food)
Shedding	• enteral (intracelluar proliferation in intestinal mucosa) • adult animals often chronic carriers for months
Clinical picture	• intestinal coccidiosis: mainly caecal tympany; watery, foul-smelling diarrhoea; inappetence; apathy [15] • bile duct coccidiosis: hepatopathy, fatigue, reduced food intake, diarrhoea or constipation, ascites, icterus
Course	• epidemic, high mortality (especially young animals), depending on infectious dose, pathogenicity and individual constitution
Diagnosis	• **faecal examination**: microscopic (fresh, flotation)
Treatment	• sulfonamides, toltrazuril (not approved for small mammals)
Prophylaxis	• oocysts remain infectious for months after sporulation in the outside world • repeated thorough cleaning and disinfection of the surrounding areas [6]

Helminthiasis

Worm infestations sometimes occur in rabbits. In rabbits, particularly nematodes (roundworms/threadworms) are relevant (see Table 4). Cestodes are rare in wild rabbits and even less common in domestic rabbits. Detection is done by microscopic faecal analysis of a fresh sample and after flotation – if trematode larvae are suspected also after sedimentation.

Conclusion

The importance of infectious diseases in rabbits should not be underestimated. With the knowledge about possible pathogens and the corresponding detection methods, diagnosis can be made without delay and treatment can be optimised.

Table 4: Fact sheet helminthiasis in rabbits [15]

Helminthiasis	Data and facts
Nematodes	***Passalurus ambiguus* ("rabbit pinworm", oxyuriasis)** • frequent, parasitise mainly in the caecum • larvae hatch in the rectum and can then be seen at the anus and/or on the faeces • **signs** only after severe infestation (usually asymptomatic) • **diagnosis:** tape impression from anus, eggs in faeces (fresh, flotation) ***Graphidium strigosum* (stomach worm), *Trichostrongylus retortaeformis Strongyloides spp., Trichuris leporis*** • rare, especially in young animals when fed contaminated herbage • **signs:** apathy, inappetence, enteritis, mucous-watery diarrhoea, cachexia, subacute to chronic catarrhal inflammation of the intestine in massive infestations • **diagnosis:** flotation
Nematodes	***Anaplocephalidae*** • rare in wild rabbits, very rare in domestic rabbits • intermediate host: moss mite, beetle mite ingested with the herbage • **signs** young animals: catarrhal enteritis with diarrhoea, cachexia, developmental disorders, constipation in case of severe infestation • **diagnosis:** flotation
Trematodes	***Fasciola hepatica* (common liver fluke),** ***Dicrocoelium dendriticum* (lancet liver fluke)** • rarity, usually not significant • infection through herbage contaminated with metacercariae or infected ants • **signs common liver fluke:** hepatitis, cholangitis, inappetence, cachexia, icterus, oedema formation • **signs lancet liver fluke:** unnoticed, no clinical signs • **diagnosis:** combined sedimentation-flotation method, most often necropsy findings

References: The list of references is available on request.

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