SPECIFIC DISEASES OF RABBITS

Diseases caused by bacteria

Pasteurellosis (Snuffles, pneumonia)

The Pasteurella species cause various diseases in rabbits. The most common organisms are Pasteurella haemolytica and Pasteurella multocida. Pasteurella haemolytica infection in rabbits is associated with chronic rhinitis (colds), pneumonia or death. Pasteurella multocida causes chronic rhinitis, colds, snuffles, pneumonia, peritonitis and septicemia.

Transmission: Pasteurella organisms are found in the environment and in mucous membranes of healthy animals particularly in the respiratory tract mucosa. There are some predisposing factors involved with susceptibility of Pasteurella infection in rabbits including avitaminosis, inadequate diet, poor husbandry and hygiene, fungal and parasitic infections. The most common source of infection is contact with other infected rabbits and usually, an animal is infected through the respiratory tract. The organism can also be spread from contaminated equipment and cages.

Antemortem findings:

Chronic rhinitis (Colds):

1. Sneezing
2. Clear, watery or thick-yellow nasal discharge
3. Soiled discoloured fur on the inner side of the front legs
4. Muzzle covered with discharge

Rabbits usually do not recover from this infection and may have periodic flare-ups of the cold. The colds may lead to classically described snuffles and further to pneumonia.

Snuffles (Contagious catarrh): This is a chronic and destructive form of cold in rabbits.

1. Frequent “snuffles” and forceful loud sneezing in rabbits
2. Mucoid to cream coloured purulent nasal discharge
3. Purulent conjunctivitis and cloudy eyes
4. Death due to weakness and secondary pneumonia or septicemic infection

Pneumonia:

1. Elevated temperature
2. Dullness and noisy forceful breathing
3. Bluish ears and eyes
4. Death anywhere from 12 hours to 4 days. The survivors may be stunted.

Peritonitis:

1. High temperature
2. Fast and shallow breathing
3. Reluctance to move due to sore abdomen

Septicemia:

1. A dead rabbit may be the first sign
2. Extreme weakness and high temperature
3. Difficult (heavy) breathing
4. Bluish discoloration of the ears and skin
5. Abortion in breeding does

Abscesses:

1. Abscesses on the neck, dewlaps, ribs and back
2. Abscesses in the mammary gland of a doe

Eye and middle ear infection:

1. Partial or complete blindness
2. Pronounced head tilt (may fall over easily)
3. Inability to right themselves

Mastitis: Swollen, bluish glands in lactating does. Ulceration and sloughing may occur with discharge of pus from diseased tissue.

Metritis:

1. White discharge from the vulva
2. Abortion with poor breeding success

Arthritis: Enlarged, painful swollen joints

Postmortem findings:

Snuffles: Inflammation and necrosis of nasal passages which contain mucoid to white purulent material

Pneumonia:

1. Consolidated inflamed area in the lungs. Deep red, sharply demarcated lung lesion and whitish purulent material in the bronchi
2. Cheesy material (fibrin) on the pleura
3. Inflammation of the pericardium and trachea
4. Death caused by inflammation of pleura and collapsed lungs

Peritonitis:

1. Yellow-white deposits (fibrin) on the peritoneum and abdominal cavity (Fig. 211)
2. Abdominal organs adherent to the peritoneum and with one another

Septicemia:

1. Haemorrhages on body fat and heart muscles
2. Enlarged body organs  
3. Bluish discoloration of body tissues

Abscesses: Walled off abscesses containing white creamy cheesy pus.

Eye and middle ear infection:

1. Normal eye structure is obliterated by white or yellow pus  
2. White pus in one or both middle ears with rare extension to the brain

Mastitis: Swollen mammary gland with red to blue discoloration and congestion. White abscesses may be observed in the gland.

Metritis: Distended uterus contains white pus.

Arthritis: Cloudy fluid and pus present in the leg joints

**Fig. 211:** Pasteurellosis. Yellowish-white fibrinous deposits in the abdominal cavity.
Judgement : Carcass of the animal is *condemned*.

- if clinical signs of severe acute pneumonia or peritonitis with accompanied fever are manifested on postmortem with swollen haemorrhagic lungs or fibrinous deposits on the peritoneum and organs.
- if multiple abscesses are found throughout the body or in the abdominal cavity.
- in cases of septicemia on antemortem and postmortem examination.
- if inflammation of the joints is associated with emaciation.

A mild form of the disease showing colds, snuffles, middle ear infection, mastitis or metritis, which do not affect the wholesomeness of the meat or cause systemic changes, may have a *favourable judgement* of the carcass. A few well off abscesses may also render meat fit for human consumption although the carcass may be judged *inferior* due to mutilation caused by removing of abscesses. Consumer should be made aware of this defect by the controlling authority.

**Differential diagnosis** : Salmonellosis and coccidiosis. Bacteria such as E. coli, Pseudomonas, Listeria and Proteus may cause metritis in rabbits. Staphylococcus aureus has been cultured from mastitis, metritis and arthritis cases. Staphylococcus and Bordetella have been isolated from the respiratory lesions and Streptococcus spp and Actinomyces pyogenes from abscesses.

**TYZZER’S DISEASE**

**Etiology:**

*Clostridium piliforme*, an obligate intracellular bacterium, is a Gram-negative, pleomorphic, filamentous organism that can produce spores. There are multiple strains of this bacterium.

**Incidence:**

The incidence of disease is rare in research animals and occurs in young or recently weaned rabbits as a result of an abrupt change in diet, antibiotic therapy, immunosuppressive therapy, or environmental stressors.

**Transmission:**

The disease is spread by spore ingestion (fecal-oral route).

**Clinical Signs:**

In acute clinical disease, profuse, watery, brown diarrhea, dehydration, and death within 12 to 48 hours after onset of diarrhea are typical. The mortality rate is high. In chronic disease, there may be progressive weight loss with soft feces. Exposure of naive adult rabbits may cause little to no clinical disease.
Lesions:

Characteristic lesions are seen in the liver, myocardium, and intestinal tract. In the liver, white, gray, or yellowish foci of necrosis, 2 mm in diameter, are few to disseminated. The hepatic necrosis is most marked and disseminated in foals in which the multiple necrotic foci with slightly depressed hemorrhagic centers appear to infect almost every hepatic lobule. In addition, there is marked hepatomegaly, and the hepatic lymph nodes are edematous and hyperplastic. In rabbits, severe lesions develop in the intestines and heart. The terminal ileum, cecum, and proximal colon are diffusely reddened. Diffuse (“paint-brush”) hemorrhage is frequently seen on the serosa of the cecum. Patchy areas of mucosal necrosis are present in the cecum and colon, together with marked edema of the wall of the cecum. Mesenteric lymph nodes may be enlarged and edematous. White streaks in the myocardium may be present, especially near the apex. Intestinal and heart lesions are generally milder or absent in other animal species.

Microscopically, there are numerous widespread multifocal areas of necrosis and hepatitis. In foals, the hepatic lesions are more pronounced than in other animals. Often the necrotic foci are so numerous that two or more coalesce. The hepatocytes in the center of the necrotic foci are destroyed and replaced by a mixture of mononuclear cells, neutrophils, and red blood cells. The causative bacteria are found in a crisscross pattern in viable hepatocytes at the periphery of the necrotic foci. In the cecum and colon of rabbits, patchy areas of necrosis extend as deep as the muscularis externa with associated mucosal and submucosal infiltrates of neutrophils. Organisms may be found within the epithelium, muscularis mucosa, and muscularis externa of the affected intestine. When cardiac lesions are present, they consist of foci of fiber fragmentation, vacuolation, loss of cross-striations, and minimal inflammatory cell infiltration.

Classic mucoid fecal staining of tail region in a rabbit with enterotoxemia
Multifocal hepatic necrosis

Diagnosis:

Serology of the blood and PCR assay of the feces of suspect infected animals may be used clinically to test for *C. piliforme*. However, clinical signs in addition to the commonly available diagnostic methods must be interpreted together for a presumptive clinical diagnosis.
In postmortem specimens, a diagnosis is based on demonstration of organisms in tissue sections with special stains. *C. piliforme* stains poorly with H&E and Gram stains. With Giemsa stain, the bacillus stains well in the liver and intestinal epithelium and in smears of infected organs but poorly in smooth muscles and cardiac muscle cells. The Warthin-Starry or Levaditi silver stains are preferable to other stains, because the bacillus stains well in the cytoplasm of all infected cells. In addition to special histochemical stains, the PCR assay can be used to detect *C. piliforme* gene sequences in liver tissues from infected animals.

**Parasitic diseases**

**Diseases caused by protozoa**

**Coccidiosis**

Coccidiosis is the most common parasitic disease of rabbits which occurs in hepatic and intestinal forms. Liver coccidiosis is caused by *Eimeria stiedae* and intestinal coccidiosis by *E. magna*, *E. perforans* and *E. irresidua*.

**Transmission:** Faecal contamination of water and food containing oocysts. Humid, dirty and overcrowded rabbit houses predispose rabbits to the infection.

**Antemortem findings:**

1. Loss of appetite and emaciation
2. Anaemia
3. Diarrhoea in terminal stage
4. Dry fur, pot belly and death

**Postmortem findings:**

1. Small greyish white nodules in the liver in *E. stiedae* infections (Fig. 213)
2. Older lesions coalesce and form cheesy masses
3. In intestinal coccidiosis the contents of the intestine are soft and the lesions pinhead size.
4. Greyish white flakes in the intestinal wall
5. Thickened and pale intestinal wall in more advanced cases
6. Oocysts present in the intestinal content

**Differential diagnosis:** Pasteuriosis, tuberculosis, pseudotuberculosis, listeriosis and salmonellosis.
Fig. 213: Coccidiosis. Enlarged liver with multifocal greyish-white coalescing lesions and yellowish liquid pus caused by E. stidae.

**Ectoparasites**

The ear mite *Psoroptes cuniculi* is a common parasite of rabbits worldwide. Mites irritate the lining of the ear and cause serum and thick brown crusts to accumulate, creating an “ear canker.” Infested rabbits scratch at and shake their head and ears. They lose weight, fail to produce, and suffer secondary infections, which may damage the inner ear, reach the CNS, and result in torticollis. The brown crumbly exudate should never be removed in a conscious rabbit, because this is very painful. The crusts will slowly slough off as the mites die and the tissue underneath heals. The incidence is much lower when rabbits are housed in wire cages instead of solid cages. The mite is readily transmitted by direct contact. Rabbits should be treated systemically with any of the miticides approved for use in dogs and cats. A variety of injectable ivermectin treatment regimens effective against both fur and ear mites have been reported, with the dosage of ivermectin 200–400 mcg/kg, SC, two or three treatments 10–21 days apart. Mites may also be treated with selamectin (20 mg topically every 7 days has been effective).
Fur mite infestations are common, and two genera, *Cheyletiella* and *Listrophorus*, are found worldwide. A number of different species of the genus *Cheyletiella* are found on rabbits. The most common in North America is *C. parasitivorax*. The genus *Listrophorus* has but one species, *L. gibbus*. These mites live on the surface of the skin and do not cause the intense pruritus seen with sarcoptic mange. Fur mite infestations usually are asymptomatic unless the rabbit becomes debilitated. *Cheyletiella* may be noticed as “dandruff.” Scraping the dandruff onto a dark paper or background will demonstrate the “walking dandruff,” as *Cheyletiella* is called. Transmission is by direct contact. Diagnosis is accomplished by skin scraping and light microscopy. *Cheyletiella* mites may cause a mild dermatitis in people, especially on the arms. Weekly dusting of animals and bedding with permethrin powder can control *Cheyletiella* mites.
Rabbits are rarely infested with either *Sarcoptes scabiei* or *Notoedres cati*. These mites burrow into the skin and lay eggs. The rabbits are extremely pruritic, and the parasites are difficult to eliminate on domestic rabbits. The condition is extremely contagious and can be transmitted to people.

Fleas of the *Ctenocephalides felis*, *C canis*, and *Pulex irritans* species can affect rabbits and many other animals. Imidacloprid is a flea adulticide; the feline dose should be divided in two or three spots to treat rabbits infested with fleas. Fipronil is contraindicated for use in rabbits because of potential toxicity. Flea collars are also not recommended. It is important to also treat every cat and dog in the house, because the original host is not usually the rabbit.

**Myiasis (botfly) in rabbits.**

Myiasis caused by larvae of the *Cuterebra* sp. flies is found only in the USA. It is most commonly observed during the hot humid summer months and during fall, and affects mainly younger animals. *Cuterebra* sp. flies are large, hairy, and characterized by the absence of a functional mouth. Their life span is short, and aimed only at the reproduction of the species. The larvae of several species of the *Cuterebra* sp. flies can infest rabbits and other lagomorphs. They include *Cuterebra buccata*, *C. cuniculi*, *C. lepivora*, *C. abdominalis*, *C. jelloni*, *C. ruficrus*, and *C. lepusculi*. The parasitic larvae of these flies can infest human beings and other animals as well, including dogs, foxes, cats, and minks.

Unlike with fly-strike, a *Cuterebra* sp. larva strike is not linked to poor hygiene. Indeed, the eggs are not deposited on skin soiled with urine or excrement, but near the entrance to a rabbit burrow, other lagomorph nests, or near an outdoor rabbit hutch. House rabbits can also be struck by botfly larvae, when a fly enters a home, and deposits eggs in the rabbit’s living environment. When the botfly larva emerges from the egg, it will migrate onto a (wild) rabbit, cottontail, or hare. It enters the body of its host through the skin (breaks in the skin or any natural openings), after which it penetrates the mucosa. The larva will migrate further in the body, using the trachea and the abdominal cavity to move to a subcutaneous location. There it will develop a 2 to 3 cm
long furunculoid cystic structure, with a fistula (respiratory hole) at the surface of the skin, and swelling of the subcutaneous tissues.

Botfly *Cuterebra* sp. and maggot

Depending on the species of botfly, the cysts will develop in different parts of the rabbit's body. Larvae of *C. buccata* can infest the entire abdominal region (especially the inguinal area, abdomen or shoulders), whereas larvae of *C. horripilum* have mainly been observed in the cervical region. When the larva reaches the stage of pupation, it disengages from the cyst and falls off.
Neck of a rabbit infested with a Cuterebra sp. larva

Left: Close view of the respiratory hole
Right: Larva after surgical removal

Clinical signs

The clinical signs are generally sufficient for a proper diagnosis.

The early stages of myiasis are sub-clinical. With time however, a rabbit becomes depressed, anorectic, dehydrated and weak, loses weight, and may go into shock if the infection is severe. At this stage the infection becomes discernible, with a visible fistula in the
skin, accompanied by a lump or a cystic structure. The lesion is painful, and causes great distress to the rabbit.

Progressively the skin around the hole becomes moist, and the surrounding hair matted, leading to the development of secondary bacterial or fungal infections.

Young wild affected by a *Cuterebra* sp. maggot in the neck.

There is potential for aberrant migration of the larvae into the nasal cavity and sinuses, or the eyes. Migration into the trachea has also been observed, leading to the formation of laryngeal edema, blocking the air supply to the lungs, and sometimes accompanied by concurrent accumulation of mucus, and swelling of the esophagus. Migration into the brain, via the ear canal is a further potential danger. Once in the brain, it will cause severe and irreversible neurological damage.

**Diagnosis**

The history of the rabbit and the clinical signs are generally sufficient for a proper diagnosis.
Fleas –

Fleas are not common in household rabbits. These patients will often present with flea dirt (dried blood), hair loose from scratching, and the appearance of fleas themselves. Treatment is similar to cats with revolution and treating the environment.