

## **Non-infectious diseases in small mammals**

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### **Dental Diseases**

Dental disease may present as excess salivation (slobbers), teeth grinding or anorexia. Oral examination and palpation along the ventral surface of the jaw should be a part of routine physical examinations of rabbits. Dental abscesses may develop because of foreign bodies (eg. plant material embedded between the tooth and gum), pulp exposure after tooth trimming, inappropriate diet, or other diseases. Dental abscesses also may appear as retrobulbar abscesses. Hence, a rabbit that presents for primarily ophthalmologic signs such as epiphora or exophthalmus should receive a full dental examination. Rabbit incisors may wear differently depending on diet, and a pelleted diet may predispose the rabbit to dental disease. Multiple teeth are commonly affected. A thorough oral examination under heavy sedation or full anesthesia and diagnostic radiographs are indicated. Often a skull CT provides significantly more information because of the complexity of the lesions and the 3D structure of the head (which is difficult to fully image with plain radiographs).

### **Dental Malocclusion:**

The incisors, premolars and molars of rabbits grow throughout life. The normal length is maintained by the wearing action of opposing teeth. Malocclusion (mandibular prognathism, brachygnathism) probably is the most common inherited disease in rabbits and leads to overgrowth of incisors with resultant difficulty in eating and drinking. Dental trimming should be done under good sedation or general anesthesia. Occasionally, the cheek teeth overgrow and cause severe tongue or buccal lesions. Because malocclusion is generally considered to be inherited, rabbits with this condition should not be bred. However, young rabbits can damage their incisor teeth by pulling on the cage wire, which results in misalignment and possibly malocclusion as the teeth grow. This condition is difficult to differentiate from genetic malocclusion. Genetic malocclusion generally can be detected in rabbits 3–8 weeks old. If incisors are suddenly overgrown in an adult rabbit, it is not enough to trim the incisors down. The problem commonly originates in the back of the mouth, and a full assessment of the cheek teeth is warranted. The dental procedure needs to be done under full anesthesia and with special equipment. Rabbit dentistry is very different from that in dogs and cats because of the differences in anatomy and physiology. Special training and literature about rabbit dentistry is readily available, and dental procedures in rabbits should be performed only by those with specific training.

### **Heat Exhaustion**

Rabbits are sensitive to heat. Hot, humid weather, along with poorly ventilated hutches or transport in poorly ventilated vehicles, may lead to the death of many rabbits, particularly pregnant does. Affected rabbits stretch out and breathe rapidly. Hutches should be constructed so that they can be sprinkled in hot, humid weather. Free access to cool water should be provided. When the environment can be controlled, optimal conditions are a temperature of 50°–70°F (15,5°–21°C) and a relative humidity of 40%–60%, with 10–20 air changes/hr. Wire cages are preferable to solid hutches. Treatment consists of immersing rabbits in cold water during the heat of the day, especially those that will kindle in the next day or two. Breeding bucks may lose a majority of viable sperm and might not breed successfully for several weeks until new sperm production replaces the sperm killed by thermal stress.

### **Hutch Burn (Urine burn)**

Prolonged irritation of the bladder mucosa with calcium sediment can cause a cystitis that can manifest in incontinence and soiled fur (see Urolithiasis). A wet perianal area often causes additional problems such as fly strike and dermatitis. This condition is often referred to as hutch burn. Hutch burn is often confused with treponematosis and can be truly differentiated only by the absence of spirochetes on darkfield microscopy and by the lack of antibodies to *Treponema paraluisencuniculi*. It is caused by wet and dirty hutch floors and affects the anus and external genitalia. Also, rabbits that lack adequate sphincter control of the bladder constantly dribble urine and may be affected. The membranes of the anus and genital region become inflamed and chapped. The area soon becomes secondarily infected with opportunistic pathogenic bacteria.

Brownish crusts cover the area, and a hemorrhagic, purulent exudate may be present. Keeping hutch floors clean and dry and applying nitrofurazone or an antibiotic ointment to the lesions hastens recovery.

### **Moist Dermatitis**

Female rabbits have a heavy fold of skin on the ventral aspect of the neck. As the rabbit drinks, this skin may become wet and soggy (“slobbers”), which leads to inflammation. Contributing factors include dental malocclusion, open water crocks, and damp bedding. The hair may slip, and the area may become infected or flyblown. The area often turns green if infected with *Pseudomonas* spp. Automatic watering systems with drinking valves generally prevent wet dewlaps. If open water receptacles are used, they should have small openings or be elevated.

Once the area is infected, the hair should be clipped and antiseptic dusting powder applied. In severe cases, parenteral antibiotics and analgesics are necessary.

### **Ophthalmologic Disease**

Corneal ulceration is the most common ophthalmic problem of rabbits. Rabbits appear predisposed to this condition for two main reasons:

- 1) the globe and surface of the cornea are significantly larger in rabbits than in most other domesticated pets, and
- 2) rabbits do not blink as frequently as other species, which leaves the cornea less moist.

Many potential underlying issues should be excluded, although environmental causes and trauma are the most frequent causes. The cornea should be carefully protected during anesthetic procedures. The lack of tear production associated with

keratoconjunctivitis sicca or dry eye may further increase the risk of corneal damage. Exophthalmia as a result of orbital or dental disease or facial paralysis associated with encephalitozoonosis can make blinking difficult and lead to corneal damage. Superficial ulcers can be treated with broad-spectrum ophthalmic antibiotic solutions. Treatment progress should be assessed in 1–2 days. Epithelial "lips" indicate a nonhealing ulcer.

Such ulcers should be debrided after application of a topical anesthetic, followed by the same treatment as for a superficial ulcer. If the ulcer does not respond to topical treatment, collagen shields or even contact lenses have been used successfully. In severe cases, surgery and placement of a conjunctival pedicle graft may be required. Differential diagnoses of corneal lesions in rabbits include corneal occlusion (overgrowth of conjunctival tissue) and limbic or corneal dermoid (skin-like tissue in an abnormal location over the cornea). Hair may protrude from a limbic dermoid. These growths do not appear painful.

### **Pseudopterygium**

An aberrant growth of conjunctival membrane tissue is sometimes seen in rabbits. The cause is not known, and the condition is slowly progressive. The conjunctival membrane extends from the bulbar conjunctiva and slowly grows onto the cornea, giving the eye an opaque appearance. Surgical removal of the overgrown conjunctiva is straightforward but leads to recurrence. Daily administration of topical cyclosporine 0,2% in the affected eye might help slow down recurrence.

### **Ulcerative Pododermatitis**

Ulcerative pododermatitis does not involve the hock but the plantar surface of the metatarsals and, less commonly, the volar surface of the metacarpal-phalangeal region. The cause is either pressure on the skin from bearing the body weight on wire-floored cages or trauma to the skin from stamping, with secondary infection of the necrotic skin. Several factors, including accumulation of urine-soaked feces, nervousness, posterior paralysis after a spinal cord injury, and the type of wire used, may influence development. Genetics are also involved. The Rex appears to be predisposed because of the lack of the longer guard hairs that usually act as a cushion over the predisposed area of the hock. Heavy-breed rabbits such as the Flemish Giant and the Checkered Giant are also susceptible. Affected rabbits sit in a peculiar position with their weight on their front feet. If all four feet are affected, they tiptoe when walking. Various debriding agents can be used to clean the lesion, followed by topical antibiotic treatment along with parenteral antibiotics. Radiographs exclude osteomyelitis with severe lesions. The rabbit must be removed from the cage or given a solid floor (board or mat) on which to sit or rest. Treatment is often difficult and time consuming, with application of bandages that need frequent changing. Low-level laser therapy has shown some benefits and is encouraged.

Husbandry improvement should focus on providing soft, dust-free bedding. In many cases, weight management is also indicated. Because large feet and thick footpads are hereditary, selection of breeding stock for these traits has reduced the incidence of pododermatitis.

### **Urolithiasis**

Urolithiasis is seen routinely in pet rabbits and occasionally in commercial rabbitries and other small mammals.

It is generally suspected when hematuria is seen (a dipstick can quickly exclude normal pigment causes of red urine). The rabbit's calcium metabolism is significantly different from that in other vertebrates. Rabbits do not require vitamin D3 to absorb calcium from the gut into the bloodstream. The vast majority of dietary calcium is readily absorbed into the bloodstream, leading to relatively higher blood calcium levels (up to 16 mg/dl [4 mmol/l] can be normal). Renal elimination of calcium is much higher in rabbits (as high as 60%) than in other vertebrates (2%–5%). This often gives the urine a cloudy appearance, which is normal. Feeding a calcium-rich diet for a prolonged time to a metabolically inactive rabbit (not growing, pregnant, or lactating) can lead to an abnormal hypercalciuria, and calcium can precipitate out as bladder sludge or form uroliths. Small stones are often voided, but surgery is frequently needed to remove larger urinary stones. Uroliths are caused by calcium carbonate and triple phosphate crystals precipitating out of normal urine when the pH increases to 8.5–9.5. Normal rabbit urine has an average pH of 8.2. Several factors have been incriminated in urolithiasis, including nutritional imbalance (especially the calcium:phosphorus ratio), genetic predisposition, infection, inadequate water intake, and metabolic disorders. Short-term treatment involves surgically removing the uroliths, whereas long term treatment focuses on reducing dietary calcium intake. Because alfalfa is high in calcium and one of the main dietary components of regular rabbit pellets, switching to timothy-based pellets and to grass or timothy hay and rolled oats helps to prevent recurrence.

### **Neoplasia**

By far, the most common tumor in rabbits is uterine adenocarcinoma. The incidence can be as high as 80% in intact does >3 years old. The disease may present with multicentric tumors that involve both horns of the uterus. The masses can often be palpated as globular polypoid structures. The tumor often metastasizes to the liver, lungs and other organs. Cystic mastitis may develop concurrently. This disease is the primary reason to recommend spaying of nonbreeding female rabbits at the age of 4–6 months. Lymphoma and other neoplastic disorders of lymphoid tissue are common tumors that occur in all ages of pet rabbits. Malignant lymphomas (lymphosarcoma) are relatively common and may occur in rabbits <2 years old. The manifestation can be extremely varied, ranging from ocular lesions, to skin, to leukemic forms. Lymphosarcoma presents with a tetrad of lesions, including enlarged kidneys, splenomegaly, hepatomegaly and lymphadenopathy. Treatment of lymphoma can be attempted by chemotherapy, but prognosis is often poor due to the often aggressive form of the disease.

Rabbits can be treated with "typical" chemotherapeutic agents, and adverse effects to these drugs appear less common than in other domesticated pets. Thymoma and thymic lymphoma are the most common mediastinal masses in rabbits.

Differentiation between the two is difficult and usually requires a fine-needle aspirate or a biopsy of the chest mass. The typical clinical sign for a chest mass in rabbits is intermittent or permanent exophthalmos. Because of the impaired venous return from the head through the chest, the venous sinuses behind the globe expand and cause the exophthalmos. A chest radiograph to scan for masses should be performed in all rabbits with exophthalmos. The thymoma can sometimes be removed surgically relatively easily, because it does not involve other major structures in the chest cavity. In the case of thymic lymphoma, surgery is often less successful, because the structure is often not possible to be removed in toto. Radiation of the thorax has been

described as an effective therapy, and animals have survived for years after the treatment. If no advanced therapy is an option, oral prednisolone has been used in a few cases with moderate success.