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Paws, good indicators of the rabbit's health (1)

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Density of fur on limbs and their cleanliness is indicative of the health of a rabbit and its living environment. Indeed, paws are used to wash the face, ears, clean nasal discharge, but they are also in contact with the floor and litter.

Examination of the feet soles of a rabbit provides reliable information as to its health, hygiene and living conditions. A healthy and clean foot sole does not smell. It is covered with fur, except under the tiny pads at the

base of the digits (Figure 1). Fur may be slightly worn, but should not be tangled, broken or stained by feces or urine. The skin at the basis of the hair must be dry and slightly pinkish. Any signs of inflammation



Figure 1: Pale pink pads at the base of fingers and unbroken hair, signs of good health.

and/or redness on and near the digits, areas devoid of fur, skin that feels hot or triggers a pain reaction to the touch, skin that is moist or has an unpleasant odor, must be taken seriously. These clinical signs are often linked to bacterial, fungal or parasitic infections. They can be caused by a poor diet, poor hygiene (dirty litter) or adverse weather conditions such as damp heat. Mechanical problems such as a leaking watering bottle can have similar undesired consequences. Finally, a rabbit can pinch a digit or a paw in the wire of its pen or its carrier, when closing a door, which can also cause skin lesions.

A contagious issue: fungal infection

Cutaneous fungal infections are uncommon in rabbits and rarely occur in epidemic form in a rabbit group. They are rather sporadic infections on an individual

rabbit. Young individuals are more sensitive, as well as rabbits whose immune system is weakened by stress or illness. Fungal pathogens are mainly *Trichophyton mentagrophytes* - mostly found in farm rabbits and rodents, and *Microsporum canis* - found more often in pet rabbits and transmitted by dogs and cats. These fungi have a zoonotic potential, which means that infected rabbits can transmit ringworm to humans if basic hygienic precautions are not taken (Figure 2).

The fungus infects the skin and related skin structures such as hair follicles and hairs. Their presence destroys keratin, which leads to the breakage of the affected hair. It is accompanied by an inflammatory reaction of the epidermis and the dermis. Inflammation causes compression of hair follicles and, consequently, alopecia appears. Secondary bacterial infections can



Figure 2: Sparse fur on top of paws affected by ringworm..



Figure 3: Lower side of a rabbit paw with ringworm, reddish skin and swollen fingers and broken hairs.

develop in the hair follicles. Fungi, furthermore, secrete toxins and other substances that cause allergies. This triggers an immune reaction on the part of the rabbit. The acquired immunity is life-long. The risk of future re-infections is, thus decreased.

Clinical signs of fungal infection

Fungal infections are typically observed on the digits of paws and on the head of a rabbit, before it spreads to the rest of the body when the rabbit is washing (Figures 2, 3). Fungal infections cause little or no itching. Affected areas are usually localized. The skin is inflamed, reddish and scaly, and may be covered with small dry crusts. Hairs are broken, the density of the fur is decreases and permanent alopecia is sometimes observed. The onset of

secondary bacterial infections is characterized by purulent lesions.

Diagnosis

When a cutaneous fungal infection is suspected in a rabbit, a fluorescence test can be done. Diagnosis is not definitive as some dermatophytes do not fluorescence (*Trichophyton mentagrophytes*). In others, the ability to fluorescence depends on the strain (*Microsporum canis*).

The search for spores in skin samples obtained by scraping and dissolved in a 10% KOH solution is also possible. Gomori-methenamine-silver (GMA) staining, Gridley's technique and Schiff periodic acid (PAS) confirm the presence and identification of arthrospores.

Finally, culture on a specific medium is slow, but it often helps with the

identification of the dermatophyte. The obtained results are not always reliable and must be supplemented by a histological analysis.

It is important to differentiate fungal infections from other causes of alopecia on the head and ears (genetic alopecia, trauma, hair plucking).

Fungal infection treatment

Fur around the lesions should be delicately shaved, put in a plastic bag and, if possible, destroyed by fire. If the lesions are small and localized, this treatment is often sufficient to eliminate ringworm, but recurrences are possible. Local treatment is possible with creams containing antifungal molecules such as clotrimazole, enilconazole, itraconazole, terbinafine, ketoconazole (should be avoided in breeding rabbits) or miconazole. Most of the aforementioned products are not licensed for use in rabbits, yet they have been used successfully in the treatment of cutaneous fungal infections in this animal.

Since ringworm is highly contagious, the person carrying and examining the rabbit should wear disposable plastic gloves. The rabbit cage and living environment should be well cleaned and surfaces washed with bleach.

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