INTRODUCTION
Rabbits are becoming more popular in the UK, and the knowledge and commitment of their owners means that the demand for veterinary services for this species is increasing. If a diagnosis is to be made, a similar approach is necessary to the one taken for canine and feline dermatoses. Limitations imposed by financial considerations can be a problem, but should not be assumed. This paper will discuss the approach to skin problems in rabbits, and will then detail the more common dermatoses.

APPROACH TO RABBIT DERMATOSES
It is important to have some knowledge of rabbit husbandry, as deficiencies in care may be involved in the skin disease. Owners may be quite ignorant of the basic needs of their pet, and adults presenting the rabbit may have little or no involvement in the day-to-day care of the animal.

Rabbits may be kept in several different husbandry systems. This may influence the incidence of some skin diseases: e.g. house rabbits are more likely to be exposed to cat fleas or *M. canis* dermatophytes whereas rabbits kept in large breeding groups are more likely to suffer from contagious diseases, but are less likely to be poorly fed. The pet rabbit kept outside in rural areas is more likely to be exposed to insect vectors of viral diseases such as myxomatosis.

DIAGNOSTIC APPROACH
- History
- General clinical examination
- Examination of the skin
- Differential diagnosis
- Diagnostic tests
- Diagnosis and treatment

History
Careful history taking is essential, especially when the animal in question may be examined infrequently. Many rabbit consultations start with the history ‘We found him like this’. It is important to involve the person responsible for looking after the rabbit in history taking. Adults may resist this if this person is a child, particularly if this means admitting that the problem has been mentioned before (and ignored).

Initial history
The initial history-taking should include:
- breed, age and sex of the rabbit
- length of time owned and source - pet shop, private breeder, etc.
- type of housing (hutch - indoors or out, outbuilding, house rabbit)
- size of group, and other species in direct contact or sharing environment
- what foodstuffs are given, including supplements
- what sort of water bowl or bottle is used
- how is the hutch cleaned, with what and how frequently is this done (honestly)
- any history of concurrent disease

Next, focus on the presenting complaint itself:
- duration of the current problem
- any other rabbits, or other species affected
- any people affected (if possible avoid causing alarm about zoonotic disease at this stage)
- treatments (including proprietary medications) already used, and with what effect
- is the condition pruritic and have any parasites been seen

General clinical examination
A full examination of the rabbit is important to assess its physical state and to look for signs of systemic disease. The rabbit may be stressed, making the assessment of respiratory function more difficult. Systemic disease may have an influence in the production of skin disease; for example, cheyletiellosis may be the consequence of underlying pasteurellosis. Examination of the dental arcade is of importance to skin disorders such as moist dermatitis and subcutaneous abscesses, and dental disease may reduce the animal’s ability to groom itself.

Examination of the skin
Look particularly at the following areas:
- face, including conjunctivae and examination for nasal discharge
- ventral neck
- pinnae, including external ear canal
- dorsum above the scapulae
- feet, especially the footpad areas
- external genitalia, perineum and tail fold

Skin diseases of pet rabbits
David Scarff BVetMed CertSAD MRCVS
ANGLIAN REFERRALS, 2 HIGHLANDS, OLD COSTESSEY, NORWICH, NORFOLK. NR8 5EA

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Areas of scaling, changed colour (especially any blue-green pigmentation of fur), excoriation, alopecia or subcutaneous swellings should be noted. The use of an illuminated hand lens may aid the examination for external parasites and specific tests may be performed (Table 1).

**TABLE 1: Specific diagnostic tests**

<table>
<thead>
<tr>
<th>Test</th>
<th>Technique</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin scraping</td>
<td>Clip affected area carefully; moisten skin with liquid paraffin;</td>
<td>Ectoparasites Dermatophytes</td>
</tr>
<tr>
<td>Acetate strip samples</td>
<td>Clip affected area carefully; apply strip several times</td>
<td>Ectoparasites Dermatophytes</td>
</tr>
<tr>
<td>Wood’s lamp examination</td>
<td>Allow lamp to warm up; perform test in dark room</td>
<td>Microsporum canis only Not all strains fluoresce</td>
</tr>
<tr>
<td>Fine-needle aspirate</td>
<td>Clip and clean lesion; use 21 g needle, as exudate may be thick</td>
<td>Subcutaneous abscesses Possible neoplasia</td>
</tr>
<tr>
<td>Bacterial culture</td>
<td>Standard aerobic culture</td>
<td>Pseudomonas spp.</td>
</tr>
<tr>
<td>Fungal culture</td>
<td>Take plenty of hairs or use Mackenzie brush technique</td>
<td>Dermatophyte infection</td>
</tr>
<tr>
<td>Skin biopsy</td>
<td>Sedation or general anaesthesia usually required</td>
<td>Neoplasia, sebaceous adenitis or Treponema infection</td>
</tr>
</tbody>
</table>

**DERMATOSES OF THE RABBIT**

The dermatoses of the rabbit may be divided into seven categories:
- Parasitic
- Bacterial
- Viral
- Fungal
- Behavioural
- Immune-mediated
- Miscellaneous

**PARASITIC DISEASES**

The parasites causing skin disease in rabbits are summarised in Table 2.

**Diseases caused by insects**

**Myiasis**

Flyblown rabbits are common in veterinary practices in the summer. Affected rabbits are usually depressed, with skin disease initially focused on the perineum and tail fold. Alopecia is often present, and the skin may be eroded or even necrotic. Examination will often reveal blowfly larvae (Fig. 1). Evidence of entry into body cavities worsens the prognosis. Examination often reveals underlying disease such as dental disease, locomotor disease or diarrhoea.

**Fig. 1: Perineum of a rabbit with myiasis.**

**Diagnosis:** Clinical signs and demonstration of fly larvae confirm the diagnosis. The management of underlying disease is essential.

**Treatment:** Initial clipping and cleaning of affected skin. The removal of all fly larvae is necessary. Systemic antibiotics are sometimes needed in severely affected rabbits. The use of insecticidal powders and sprays shouldn’t be necessary if underlying disease and husbandry problems are sorted out. Topical agents such as cyromazine (e.g. Rearguard, Novartis) can protect rabbits from this problem.

**Flea infestation**

Rabbits may be affected by two types of flea: the commonest is *Ctenocephalides felis*, the cat flea. *Spilopsyllus cuniculi*, the rabbit stick-tight flea, may occur, especially where wild rabbits enter the garden. The latter is of significance as a vector of myxomatosis virus.

**Clinical signs:** House rabbits sharing an environment with cats or dogs may pick up newly emerged adult *C. felis* fleas. These may cause pruritus. *Spilopsyllus cuniculi* fleas are usually found attached to pinnae margins, but may cause pruritus and crusting elsewhere.

**TABLE 2: Parasites found on the domestic rabbit**

<table>
<thead>
<tr>
<th>Group</th>
<th>Parasite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insects</td>
<td></td>
</tr>
<tr>
<td>Flies</td>
<td>Blowflies</td>
</tr>
<tr>
<td>Fleas</td>
<td><em>Ctenocephalides felis</em></td>
</tr>
<tr>
<td></td>
<td><em>Spilopsyllus cuniculi</em></td>
</tr>
<tr>
<td>Lice</td>
<td><em>Haemodipsus ventricosus</em></td>
</tr>
<tr>
<td>Mites</td>
<td></td>
</tr>
<tr>
<td>Fur mites</td>
<td><em>Leporacarus (Listrophorus) gibbus</em></td>
</tr>
<tr>
<td></td>
<td><em>Cheyletiella parasitivorax</em></td>
</tr>
<tr>
<td>Sarcoptic mites</td>
<td><em>Sarcopes scabiei var. cuniculi</em></td>
</tr>
<tr>
<td>Demodectic mites</td>
<td><em>Demodex cuniculi</em></td>
</tr>
<tr>
<td>Ear mites</td>
<td><em>Psoroptes cuniculi</em></td>
</tr>
</tbody>
</table>
**Diagnosis:** With *C. felis* fleas, often the only clinical sign is flea faeces in the coat of a normal or pruritic rabbit (Fig. 2). These are not found with rabbit fleas. Demonstration of adult fleas is diagnostic for *S. cuniculi* infestation.

**Treatment:** The eradication of *C. felis* infestation requires control of environmental stages, as well as of adult fleas. If the house does not contain cats or dogs, then environmental control alone is adequate. Imidacloprid (Advantage, Bayer) is effective for use in the rabbit to treat flea problems. Fipronil spray (Frontline, Merial) should not be used.

The control of *S. cuniculi* fleas relies upon removal of adult fleas and prevention of re-infestation by limiting exposure to wild rabbits.

**Lice infestation**

Lice are uncommon causes of skin disease in the rabbit. Rabbit lice (*Haemodipsus ventricosus*) are of the sucking type and heavy infestations may result in anaemia. Pruritus is variable, and scaling may occur with heavy infestation.

**Diagnosis:** Lice or their eggs are usually demonstrated without difficulty. The eggs are larger than those of *Cheyletiella* or *Listrophorus* (*Leporacarus*) spp. and are attached to hairs along most of the length of the egg.

**Treatment:** Pyrethrum-containing insecticidal powders or imidacloprid are usually effective.

**Diseases cause by mites**

**Fur mites**

Rabbits may be infested by true fur mites, *Leporacarus* (*Listrophorus*) *gibbus* (Fig. 3), and/or the more surface living *Cheyletiella parasitovorax* (Fig. 4). The former are often carried with no clinical signs, sometimes in large numbers. Severe pruritus has been reported with this parasite (Patel & Robinson, 1993). *Cheyletiella* spp. are more frequently associated with disease, and have some zoonotic significance. Lesions in owners consist of pruritic, erythematous papules on contact sites such as arms and the trunk. The parasites do not persist on humans once the affected rabbits are treated.

Cheyletiellosis may cause severe scaling, especially on the dorsum. When pruritic disease is caused by *Leporacanus*, the most important signs are self-trauma and associated hair loss. Clinical cheyletiellosis is more likely to occur in rabbits suffering from concurrent illness.

**Diagnosis:** Mites may be demonstrated by examination of acetate strip samples. In some cases superficial skin scrapings are required to demonstrate *Cheyletiella* spp., if present in small numbers. Sometimes eggs only are found; the eggs of *Cheyletiella* spp. and *Leporacanus* being similar (Fig. 5).

**Treatment:** Both of these parasites appear to respond to ivermectin (Xeno 450, Genitrix; Panomec, Merial), administered topically or by injection at 200–400 mcg/kg, given at two-week intervals on three occasions. If treatment does not appear to solve the problem, asymptomatic carriers (which may include dogs or cats with cheyletiellosis) or survival of parasites off the host must be suspected.

**Sarcoptic mites**

Rarely, rabbits suffer infestation with sarcoptic mange mites, *Sarcoptes scabiei*. Pruritus and crusting
Diagnosis: Demonstration of mites on examination of crusts taken from the pinna is usually straightforward, with large numbers of mites often present.

Treatment: Ivermectin, as previously described.

**Demodectic mites**

Demodectic mites have rarely been reported in the rabbit (Harvey, 1990). Affected rabbits exhibited variable pruritus, although the pathological significance of the demodectic mite is unknown.

**Ear mites**

*Psoroptes cuniculi* (Fig. 6), the rabbit ear mite, is the commonest ectoparasite of the rabbit. Mites may be carried without signs for some time, clinical disease being initiated by concurrent stress. Mites may survive for up to three weeks off the host, in shed scale carrying large numbers of mites. Severe crusting and pain of the external ear canal is usually seen. Tightly adherent crusts are present in most cases, which leave bleeding erosions when removed (Fig. 7). Affected rabbits are often pruritic, and will rub at their ears. Secondary bacterial infection of crusted surfaces is common and may extend to cause otitis media.

**Diagnosis:** Fine needle aspirates may be difficult to achieve unless a 21 g needle is used, as the exudate is very thick. Examination following staining with a rapid Romanowsky or Gram’s stain reveals the causative organisms. Examination for underlying dental disease is essential, including radiography if bone is involved. Unless such disease is identified and resolved, the abscess is likely to recur, whatever treatment is used. If a mixed infection is present, bacterial culture may be wise, including examination for anaerobic bacteria.

**Treatment:** The treatment of choice is the complete surgical excision of the abscess in its surrounding capsule. If this is not possible, then surgical opening of the abscess together with flushing and the use of
topical or systemic antibiotic preparations may help (Table 3), however such cases are likely to recur.

**Staphylococcus aureus**

Diseases caused by staphylococci may present with different clinical syndromes, from a highly fatal disease of neonatal rabbits to subcutaneous abscesses and an exudative dermatitis resembling impetigo. Mastitis and pododermatitis are also seen. Factors influencing disease include age, concurrent illness or stress and the virulence of the bacteria. A virulent rabbit biotype of *Staphylococcus aureus* has been reported in commercial Belgian rabbitries (Okerman *et al.*, 1984). Neonates suffer from sepsicaemia, sudden death, or exudative dermatitis. These are associated with poor husbandry, and are most often reported from large groups.

**Diagnosis:** Direct examination or culture of exudates.

**Treatment:** Systemic antibiotics (Table 3).

**Pseudomonas aeruginosa**

This organism causes a moist dermatitis, usually found on the ventral surface of the neck. Infection is predisposed by wetting of the skin by faulty drinking bottles, or dribbling secondary to dental disease (slobber). Staining of the fur by blue-green pyocyanin pigment may be seen.

**Diagnosis:** The clinical signs are nearly diagnostic in their own right. Bacterial culture and sensitivity testing may be useful.

**Treatment:** Clipping, cleaning and drying of affected skin is important. Topical or systemic antibiotics may be used. Unless the underlying cause of wetting is addressed, the condition may recur.

**Fusobacterium necrophorum**

This anaerobic organism is the cause of an uncommon dermatosis affecting the rabbit causing ulceration or necrosis of skin, particularly around the head and neck.

**Diagnosis:** Direct smears may reveal the organism, although anaerobic culture is necessary to confirm the cause. Mixed infections may occur, and so aerobic culture should always be undertaken at the same time.

**Treponema cuniculi**

Venereal spirochaetosis is an uncommon dermatosis of the rabbit. Transmission is by direct contact either venereally or between the mother and her young. Due to grooming, transmission to skin other than that of the genitalia is common. Vesicles, papules, oedema, erosion and crusting may be seen on the genitalia, lips, face, eyelids, ears and paws. Lesions may be mistaken for early signs of myxomatosis; scaling on the face can resemble dermatophytosis.

**Diagnosis:** Examination of biopsy samples stained with silver stains or the demonstration of the organism in dark-ground microscopy examination confirms the diagnosis.

**Treatment:** Penicillin G (50,000 IU/kg) injected at weekly intervals for three weeks is the treatment of choice. All affected and in-contact animals need to be treated, whereupon the prognosis is good. Tetracycline and chloramphenicol treatment are also effective.

**Pododermatitis (sore hocks)**

This condition is one of the most frustrating for the practitioner to deal with. Whilst bacteria are almost

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**TABLE 3: Common antibiotics used in the rabbit**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Route</th>
<th>Dose rate</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-trimazine</td>
<td>Subcutaneous</td>
<td>30 mg/kg q24h</td>
<td>Moist dermatitis, pasteurellosis</td>
</tr>
<tr>
<td>Enrofloxacin (licensed for use in the rabbit)</td>
<td>Subcutaneous</td>
<td>5 mg/kg q12-24h</td>
<td>Pasteurellosis, spirochaetosis, staphylococcal disease</td>
</tr>
<tr>
<td>(licensed for use in the rabbit)</td>
<td>Drinking water</td>
<td>50-100 mg/l</td>
<td></td>
</tr>
<tr>
<td>Penicillin (procaine benzathine)</td>
<td>Intramuscular (IM)</td>
<td>42,000 IU/kg weekly for three weeks</td>
<td>Venereal spirochaetosis</td>
</tr>
</tbody>
</table>

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Fig. 9: Sore hocks (pododermatitis).
always involved, other factors are needed to initiate disease, such as heavy body size, thin metatarsal pad fur and housing on wire. Damp bedding may also contribute. Swollen metatarsal or metacarpal areas follow scaling and erosion of the volar surfaces (Fig. 9). The swellings may be very large with necrotic centres (bumblefoot).

**Diagnosis:** The clinical signs are highly suggestive. *Staphylococcus aureus* is isolated from culture samples in most cases.

**Treatment:** Treatment will be unsuccessful if underlying factors are not improved. Heavy rabbits (>5 kg) should not be housed on wire, and bedding should be changed regularly. Management of the lesions involves the application of topical antibacterial ointments such as mupirocin 2% ointment (Bactroban). Severe lesions should be cleaned, debrided and, if possible, bandaged. The prognosis is guarded in severe cases or if lesions recur.

**VIRAL DISEASES**

**Myxomatosis**

The most important viral dermatosis of the rabbit is myxomatosis. This disease was introduced into Australia in the 1950s to help control the rabbit population and was then accidentally introduced into Europe. The disease is endemic in wild populations of rabbits in Europe.

Insect vectors spread myxomatosis virus. These include mosquitoes and the rabbit flea, *Spilopsyllus cuniculi*. Disease may vary from a peracute and usually fatal disease to papillomatous disease in partially immune rabbits. In the UK the only vaccine available is a heterologous vaccine derived from Shope fibroma virus (SFV). This is variably successful, the efficacy being increased if the vaccine is partially injected intradermally.

**Clinical signs:** In acute cases rabbits are lethargic, febrile and depressed. Oedema of the ears, lips, eyes, genitalia and anus is present, the disease rapidly progressing to death. In less virulent strains, papillomata may occur. These may regress spontaneously, although affected rabbits may be predisposed to pasteurellosis.

**Diagnosis:** In acute disease, the clinical signs are diagnostic. Initially the disease may resemble venereal spirochaetosis, but the true diagnosis is soon obvious. In subacute forms, biopsy is diagnostic in samples with intact epidermis (Fig. 10).

**Treatment:** Some rabbits may recover with intensive nursing, and particularly with maintenance of body temperature. Rabbits with subacute disease often recover. Vaccination and screening from insect vectors are helpful in reducing the incidence of the disease.

**FUNGAL DISEASE**

There are two dermatophytes of significance in the rabbit. *Trichophyton mentagrophytes* is carried asymptomatically in many rabbits. Rabbits in contact with cats and dogs may be infected with *Microsporum canis*. The zoonotic risk of small mammal dermatophytosis appears to be very slight, although it is wise to limit owners’ contact with known infected animals, especially if those owners are children.

Clinical signs for both dermatophytes are similar. Scaling, crusting and alopecia with some pruritus are found. Often the bridge of the nose is affected, together with eyelids, ears and paws. Occasionally widespread disease is found. Broken hairs may be found, and these should be collected for fungal culture.

**Diagnosis:** Fungal culture is the test of choice for diagnosis. Wood’s lamp examination may be useful in *Microsporum canis* infections, although not all strains will fluoresce. *Trichophyton* spp. do not fluoresce at all.

**Treatment:** Griseofulvin treatment at 25-50 mg/kg once daily is the treatment of choice if available. Otherwise: Topical miconazole, enilconazole or miconazole/chlorhexidine shampoos (Mycozole, Genitrix; Imaverol, Janssen; Malaseb, VetXX) are also effective. Griseofulvin is teratogenic, and so must not be used in breeding does. Care in the handling of griseofulvin by the owners is also wise. Treatment should be continued until the clinical signs have resolved. In a group, all in-contact rabbits should be treated.

**BEHAVIOURAL DISEASES**

Does in the breeding season may pluck hair from the dewlap area to line their nests. This may occur in non-pregnant does, and such rabbits may be presented for alopecia. If excessive amounts of hair are removed and swallowed, hairballs may occur.

Dominant rabbits may chew the hair of other rabbits when housed in groups (barbering). Separation of affected rabbits is necessary.

**IMMUNE-MEDIATED DISORDERS**

Recently, sebaceous adenitis has been described in...
the rabbit as a scaling disorder with some alopecia. The aetiology is unknown and there is no specific treatment. Diagnosis is by skin biopsy.

MISCELLANEOUS DERMATOSES
Congenital dermatoses, including hereditary alopecia and cutaneous asthenia (Harvey et al., 1990) have been reported in the rabbit. In the latter the skin had increased extensibility, and was easily torn. Electron microscopy revealed disorganisation and variability in the size of collagen bundles.

Seborrhoea of the skin surrounding the scent glands lateral to the anogenital line is occasionally a problem. The use of mild anti-seborrhoeic shampoos is usually helpful.

Rabbits are occasionally presented with retained telogen coat and patches of fur at different lengths following moulting. This is a problem that occurs more frequently in older rabbits. Careful grooming and attention to husbandry (nutrition and grooming) is usually helpful.

Rabbits suddenly exposed to very cold weather may suffer from frostbite, presenting as necrosis of the pinnae margins and tip.

REFERENCES AND FURTHER READING