Supreme

Promoting the Well-Being of Small Animals

Mites

Q. Some of my adult rabbits have suffered from mite infestation this year, my Lilacs being affected, but not my English. Although I believe prevention is better than cure, my infected rabbits were injected by the vet. I have since successfully used good hygiene and 'Dynamite' and prevented a recurrence. My local vets have said that mites have been affecting a wide range of animals this year, especially pets. Could you tell me about the lifecycle of this pest, sources of infection and recommend routes for prevention and treatment?
It is often suggested that mite comes in with hay and straw from farms. However, I have never had any trouble with mite when using the small expensive packs e.g. Russel Bedding, although manufacturers do not make any claims to say it is free or will protect from mite. Could you clarify this for me?

A. Mites are permanent ectoparasites i.e. they live and spend their entire lifecycle on the outside of the host animal. The rabbit seems to be susceptible to a number of different mites, both burrowing and surface mites. Mites commonly found in rabbits are *Psoroptes cuniculi, Sarcoptes cuniculi, Demodex cuniculi, Cheyletiella parasitovorax, Listophorus gibbus,* and to a lesser extent *Dermanyssus gallinae* and *Trombicula autumnalis*. These mites are responsible for a variety of conditions such as ear canker, sarcoptic mange, and 'walking dandruff'.

Life Cycle of Mites
The life cycle of the mite (parasite) and site of infestation vary greatly depending on the actual mite itself, and the conditions of the rabbit (host). For example, Cheyletiella is a surface mite and lives in the keratin layer of the epidermis. They are not associated with hair follicles unlike other mites. They move about rapidly in pseudotunnels in dermal debris, periodically piercing the skin and feeding on lymph, a clear colourless fluid. Off host survival is poor. After mating, the adult female mite lays eggs which are attached to the base of the hair in a fine cocoon (like louse nits). Eggs hatch in about 4 days (six legged white larva), which after moulting develop into an eight-legged nymph. The nymph moults again to adult form. The adults are highly active and move around rapidly. Mating can occur within 24 hours of emergence of the adults, and eggs are produced approximately 8 days later. A female can lay upto 30-50 eggs during the reproductive phase. The complete lifecycle takes 3 to 4 weeks. Psoroptes, another surface mite has a similar lifecycle, but is much shorter – from egg to egg takes about 12 days.

Burrowing mites like Sarcoptes reside in tunnels within the surface layers of the skin. Females tunnel into the epidermis and lay 3-5 eggs per day for a total of 40-50 eggs. Six legged larvae hatch and both larvae and nymphs burrow into the tissue and form pockets where they moult and feed. Adult males and females develop and mate. The females lay their eggs within nests within the tunnels and the males move to the skin surface. The lifecycle requires 2-3 weeks. Demodex mites however infest the hair follicles and sebaceous glands. The females lay 20-24 eggs in the hair follicle. Larvae and nymphs are swept by the sebaceous flow to the mouth of the follicle where they mature. The lifecycle is completed in 18-24 days.

Clinical Signs
The effects of mites upon both the appearance and health of the rabbit are of obvious concern to owners. Mild infestation may go undetected, or appear as a small patch of non-itchy dandruff within the fur. More severe infestations can cause dry flaky skin, fur loss and lesions and be so intensely itchy that the animal is so restless it does not feed properly. The extent and site of the damage very much depends on the level of infestation and the mite involved.

Diagnosis

Sometimes just the presence of dandruff and the fact that the rabbit is frequently scratching is sufficient to indicate that mite are present. Treatment for mites can be harsh, and so it is essential to firstly determine whether they are present, and secondly which ones they are. Surface mites and eggs may be obtained from coat brushings. Alternatively, the vet may gently vacuum the animal with a pipette attached to a suction unit or small commercial vacuum. A small piece of filter paper placed in the line traps the debris, which can then be examined microscopically. Apparently the animals seem to enjoy the sensation (especially if they are itchy) and it is an effective way of removing ectoparasites. This technique or simple coat brushings are ineffective for obtaining samples of burrowing mites. In this case, scrapings must be taken from the skin using a scalpel blade. Coat brushings and skin scrapes are scanned at low power with microscope. Microscopy can be used to determine the type of mite – they vary in size, shape and appendages (mouthparts and legs).

Treatment

As with diagnosis, treatment of ectoparasites can vary too – depending again on whether the mite is a surface resident or burrowing. The simplest and most effective treatment for any mite appears to be an injection of ivermectin subcutaneously. However, it has been suggested that it seems to be losing its efficacy, and so it may be necessary to use it in combination with a shampoo or other product. A variety of topical treatments are available e.g. pyrethrins, flowers of sulphur, benzyl benzoate solutions, and organophosphate preparations, herbal preparations and can be used with variable success. I too have successfully used some of the natural herbal insect repellants. Many of the treatments are ineffective against eggs, so should be repeated three times at intervals (dependent on the lifecycle of the mite in question) to ensure that all immature stages are killed.

In cases of infestation treatment of all animals on the premises is advised, in conjunction with a thorough clean of the animal's environment. Although mites do not live very long off the host (up to 3 weeks), every effort should be made to physically clean the premises, spray the area thoroughly with a good residual insecticide and improve general hygiene practices. Even hanging dichlorvos fly strips in the rabbit house can afford some prevention against infestations.

Whilst not necessarily advocated in areas containing lots of wood (sheds and hutches), washing can be a useful part of the cleaning and disinfecting process. Cold water washing can remove 90% of mites. Hot water washing (60°C or higher) is even more effective, and not surprisingly at temperatures between 100 and 130°C (autoclaving) all mites are killed. For owners of house rabbits there are many options - washing, dry cleaning and heating (superheated steam to treat carpets, tumble dry washing, dry heating with electric blankets, direct sunlight exposure) all kill mite.

Prevention

It is often difficult once mite has become established to completely irradicate the problem. It is therefore often better to use an integrated approach to prevention and control. The first thing to consider is the amount of contact between the mite and the rabbit – it tends to be more frequent when there are lots of rabbits all in a relatively small area. The environment in which the rabbit is kept is also important. Infective stages survive more readily when the climate is warm and wet. Rabbits are better adapted to colder conditions and so it makes sense to keep the rabbits on the cool side. Mites thrive in humid conditions and infective stages survive more readily when the climate is warm and wet. Where possible keep buildings aired and dry, to prevent pockets of humidity where mite can accumulate. Maintain high standards of feeding and hygiene, otherwise it will encourage illness and enhance the susceptibility to

mites. Clean the rabbits out thoroughly and use insecticides or insect repellants sensibly. Change bedding and soiled litter regularly, and destroy it rather than leaving it lying around. When introducing new stock, inspect them and dust or spray with an insecticide. Keep them in quarantine cages away from the main stock for 2 weeks to contain any infestation.

Optimum Conditions

In order to thrive mites are typically found in places that provide a source of food, shelter, warmth and humidity. Rabbit fur is the ideal microhabitat for mites - the fibres allow mites to cluster together, reducing water loss, and create pockets of humidity above the skin's surface. The length of the rabbit fur may play a part – if you liken fur to carpets, then just as there are fewer house mites in short tight piled carpets harbour compared to long piled carpet, short haired breeds may harbour significantly fewer mites than long haired breeds. Longer fibres allow accumulation of food and moisture, favourable for mite survival and breeding and offers protection from mite removal by grooming, or in the case of the carpet vacuuming!. The climate seems to affect prevalence of mite – they tend to be more abundant in summer and autumn than in winter and spring, and some years seem to be worse than others - hot dry summers do not favour mite survival. However in the UK where heat may be accompanied by large deposits of moisture environmental conditions are ideal. Global warming may be contributing to the problem. Many more rabbits are living in houses than before - centrally heated houses are an ideal breeding ground for mite. Fecundity appears to be favoured by higher temperatures and a high relative humidity. Hutch and building structure play and important role – pockets of high relative to humidity within the cage or building can affect numbers of mites.

Breed differences

As well as environmental factors affecting the activity of mites on rabbits, there can be differences between susceptibility to mites between breeds, as has been demonstrated between the Lilac and the English breeds. Skin thickness, coat length and texture, and even coat colour even may affect the severity of attack. In addition the actual age of the breed may have something to do with it – older breeds may have gone through more selection processes and in if mite resistance has been selected for (whether inadvertently or on purpose) the resulting animals may not have such a problem. Dental problems in rabbits can hinder their ability to groom adequately. It is vital to ensure that teeth are considered when selecting stock for breeding (dwarf and lop breeds seem to have particular problems), that stock are handled carefully to prevent damage to teeth and they are kept worn down through diet.

Transmission

Transmission is via direct (animal to animal) or indirect contact (crusts and debris from infected animals, contaminated bedding or clothing). The mite is highly contagious, and transmission is especially rife between rabbit kittens. The mites have a limited ability to survive away from the animal, but may reside temporarily in niches within bedding materials and wooden lined cages.

In the case of cheyletiella, mite transmits from animal to man either by direct skin contact or through clothing. Humans develop an irritating itchy dermatitis on the arms, torso and apparently eyebrows, which can be treated using any insecticidal preparation for external parasites of man. Constant animal contact is usually needed to maintain human infections. With no further infestation lesions subside in three weeks.

Hay, straw and other bedding material

I regularly receive queries about the present of mite in hay products. Mites may be found in some sources of hay and straw, but the majority by far, are those typically associated with forage materials and soil. However, some predatory mites may be found that potentially could be mistaken for Cheyletiella. Cheyletiella is a huge group of mites, containing many species. However, taxonomic identification to species level have revealed that mites found in hay are *Cheyletus eruditus* – a common mite found in cereal

stores and areas where cereals are being handled or processed. *Cheyletus eruditus* has never been related to fur loss or mange in animals. These mites possess the mouthparts i.e. jaws typically associated with predatory mites, which are required for grabbing their prey, in this case soft-bodied insects and mites which also often inhabit these areas. It was originally believed that *Cheyletiella parasitovorax* preyed on other mites, as they had similar mouthparts, but this is not the case.

Mite is more likely to be found in hay than straw. Both are materials harvested from fields, but there are subtle differences. Meadow hay is produced from permanent grassland, whereas barley comes from cultivated fields. On grassland, the swards contain a variety of fine-leafed grasses (meadow fescues) and legumes, which provides a habitat for mites, other pests and animals. Barley fields contain the one crop – and is grown for its grain, rather than the stems. The plant puts more energy into the grain, and consequently the stem is simple and contains little leaf. On harvesting the leaves dry and crumble, creating dust which is an ideal medium for mites to reside in. The swath of barley straw also tends to be drier than that of meadow hay – mites prefer humid conditions.

It is possible that wild animals within the fields may unwittingly drop mites and their eggs on it. Although mites rely on the host animal for food and shelter, they do have the ability to survive away from the rabbit, and will take up temporary residence in other habitats. When hay and straw are collected from the field, mites tend to associate with dust. Whereas many manufacturers simply fill bags with the product, others like Supreme use intensive dust extraction processes prior to packing. This removes the dust, and theoretically any mite too.

The Russel Bedding material goes through an even more rigorous process. The barely straw is passed through a shredder to produce a finely shredded substrate. Dust, fine particles and chaff are extracted and a fine mist of an organic preparation (containing natural insect repellants) is applied. It is extremely unlikely that there would be mites in the barley straw to start of with, but even if they were, it is highly unlikely that they would survive this process.

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