

Skin Diseases Refresher

Dermatophytosis (ringworm)

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Disease profile

Dermatophytosis is a highly contagious fungal infection of the skin that affects horses of all ages. In horses it is caused by 2 main genera of fungi.

1) *Trichophyton* (the commonest species in Europe are *T. equinum* var *equinum* and *T. verrucosum*).

2) *Microsporum* (the commonest species are *M. gypseum* and *M. equinum*).

Dermatophytosis is one of the commonest skin diseases affecting horses. The incubation period is 2–3 weeks and by the time the first signs of infection are clearly visible, other horses may already be infected.

There is some immunity with age and the young horses congregated together into a stable yard environment are most often at risk. In subsequent years horses may be reinfected, but the lesions are smaller, less dramatic and quicker to resolve.

The fungal infection is limited to the hair and epidermis. It seldom invades the dermis in otherwise healthy horses. Transmission between horses requires contact with a source of contaminated material. Spores are very resistant and can survive for long periods in stable environments. Biting flies can transmit the *Microsporum* spp.

Infection usually requires damaged (traumatised) skin, although only slight damage may be required. This requirement results in predilection sites around the girth, on the sides of the neck and in rug contact points on the body. More rarely spread of spores occurs in a vehicle, communal wash buckets or contaminated body brushes etc., and these can result in widespread severe lesions, which may resemble an allergic urticaria in the early stages (Fig 1).

Ringworm is an endemic disease in livery and racing horses and occurs sporadically throughout the year. Racehorses are not permitted to appear at racecourses with active dermatophytosis. In mixed livery yards it can be a serious problem also and will preclude showing and competition of affected horses for fairly prolonged periods. Exportation of infected horses is not permitted.

Clinical signs

The first sign of infection is a change in angle of the hair shaft; this causes small (often circular) (5–20 mm diameter) patches of hair to stick up against the lie of the coat (Fig 2).

In amongst the hair shafts fine accumulation of keratinised squames cause an accumulation of cigarette ash-like particles in the hair (Fig 3).

Keratolytic enzymes, produced by the fungus, cause weakening of the hairs, which break and fall out, leaving bald areas with a scaling surface (Fig 4).

Microsporum species tend to produce a smaller lesion with less weakening of the hair shafts. Also this species may not affect all the hairs equally and so, by contrast to the *Trichophyton* lesions that are easily plucked leaving an almost totally hairless area, the plucking of the lesion is sometimes painful and resented. In these cases, entire scabs of matted hair and exudate are often pulled away, leaving an oozing wet skin surface (Fig 5).

As focal areas coalesce they lose their circular appearance and become more diffuse with extensive a scaling and flaking. Healing occurs centrifugally from the centre so that the most active fungal growths are at the margins of the lesion.

In a few cases secondary bacterial infection occurs and a purulent discharge may be present.

Investigations

- Skin scraping.
- Hair pluck.
- Fungal culture (but takes a long time).

Differential diagnosis

Staphylococcal lesions can produce annular areas of partial alopecia very similar to ringworm (Fig 6).

'Sweat rash', produced by bacterial infection of the hair follicles, often has the same distribution, on the neck and other tack contact zones. The hairs however do not usually pull out easily, and small crusts are often felt at each spot.

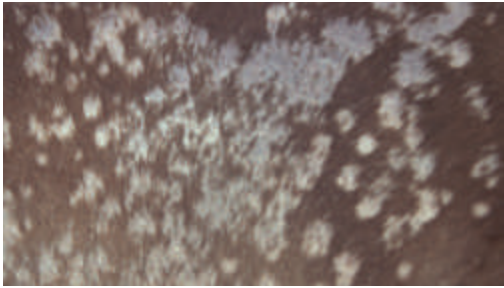


Fig 1: The 'cigarette ash' appearance of keratin scales typical of early ringworm.



Fig 2: One of the first clinical signs of dermatophyte infestation is a change in direction in which the hairs lie, causing the visual appearance of tufting.

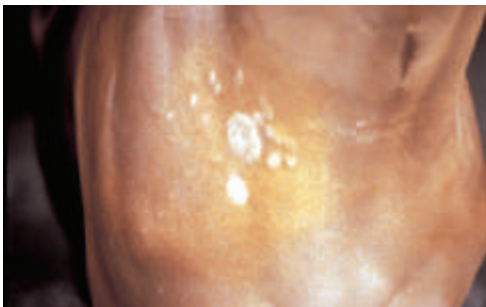


Fig 3: Dermatophyte infestation is very common at the site of contact with tack and rugs, in this case contact with the chest area of a rug.

Localised *Dermatophilus congolensis* lesions, on the face or exposed parts in the summer can resemble some forms of dermatophytosis. Occult sarcoid and chronic skin rubs and abrasions (Fig 7).

Confirmation of diagnosis

Intact hairs at the periphery of the lesion should be plucked with artery forceps for microscopy. Simply cutting off the tops of hairs is not helpful as the spores live in the follicular base of the hair.

Skin scrapings should be taken from the surface of any lesions that have already become alopecic. The blade and its associated debris are sent for analysis in a nonairtight container.

The samples should be cleared in 10% potassium hydroxide solution and/or subjected to further staining with lactophenol cotton blue. The spores can be seen chained along the hairs (Fig 9) or within the hairs in those species, which produce endothrix spores.

Complete culture of the samples may take up to 30 days, and although identification of the species may be important epidemiologically it is not usually helpful therapeutically. Confirmation of a dermatophyte infection can be obtained from culture on Sabouraud's Medium, to which phenol red dye has been added. The agar medium changes to a bright red colour within a few days of inoculation if a dermatophyte is present (Fig 10).

Note that culture of the *Microsporum* spp. is difficult and can be improved by the addition of a single drop of a multi vitamin B solution to the culture.

Wood's lamp assessment of hairs is not a useful aid in the horse, as fluorescence is variable even within the 2 genera. Only *M. equinum* sometimes shows fluorescence.

In cases of equivocal diagnosis following skin scraping and hair sampling, small punch biopsy sample should be diagnostic in demonstrating fungal spores within the hair follicles (Fig 8).



Fig 4: Note the alopecia at the centre of the early lesions (arrow), whereas the surrounding small tuft-like lesions are only showing a change in hair contour at this stage.



Fig 5: The typical appearance of a *Microsporum* spp. induced lesion following physical removal of the infected hairs and keratin layers. In contrast to lesions produced by the genus *Trichophyton*, plucking of these lesions often causes removal of a significant deep crust with serum exudation beneath.



Fig 6: Anular lesions on a horse's shoulders produced from a combination of clipping and the application of a dirty rug. These are bacterial folliculitis lesions, caused by *Staphylococcus* spp., although they resemble the size and shape of dermatophyte infection. In cases of bacterial folliculitis the hair loss is usually not as complete across the lesion, and individual unaffected hairs will be seen, producing a moth-eaten sparse less complete alopecia.



Fig 7: Another case of superficial infection with *Staphylococcus* spp. producing some degree of scaling and crusting, similar to ringworm.

Management

Identification of the species is not important for treatment, but may however identify the source of the infection and it may explain why repeated outbreaks could occur in a stable yard. Treatment involves 2 basic principles:

- a) Treatment of active infection and reduction in spore formation.
- b) Elimination of infective spores in the environment.

Most dermatophyte infections in horses are self-limiting over 5–10 weeks but treatment is often used in an attempt to limit the spread of an infection.

Equine dermatophytes are zoonotic. Gloves should be worn while handling infected horses. All skin debris and hairs removed from infected horses should be burnt.

In the medication of horses for dermatophytosis it is important to ensure that the manufacturer's recommendations are adhered to absolutely. Over strength medication may cause skin damage while under strength fungicides may have no

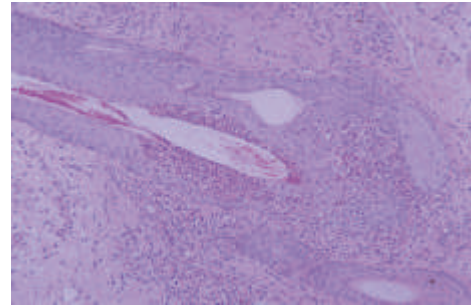


Fig 8: The microscopic appearance of a dermatophyte infected hair shaft seen in a skin biopsy.

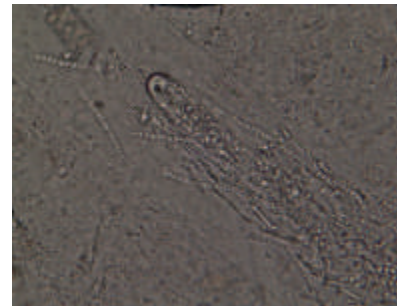


Fig 9: Chains of fungal spores seen in a superficial skin scraping soaked in KOH solution.



Fig 10: *Trichophyton equinum* growing on Sabouraud's culture medium.

effect at all. Freshly made solutions must be used each day. Fortunately there is no known acquired drug resistance in fungal infections.

The following treatment protocol may be useful:

- 1) Scale, broken hairs and scurf are heavily laden with fungal spores and individual lesions should be debrided down to the skin surface, if necessary using a debriding agent (Dermisol)¹, which is left on the lesions for several hours before removing the debris.
- 2) Topical treatment is definitely effective at preventing the progression of established lesions and limiting spore production. Several preparations are available and those most commonly used include natamycin (Mycophyte)², enilconazole (Imaverol)³ or miconazole (marketed with chlorhexidine as Malaseb)⁴. The former 2 are licensed for

use in the horse. A 10% povidone-iodine solution is also thought to be useful and 2–10% tincture of iodine, painted on, will kill most of these spores.

- 3) Griseofulvin has to be given orally for a minimum of 5 days to be incorporated in the growing 'skin conveyor'. Whilst there are anecdotal reports of its benefit, it is slow and expensive, and there is no scientific evidence to support its use.
- 4) Secondary infection may be controlled either topically or systemically. Usually elimination of the fungus results in resolution of the bacterial secondary infection.
- 5) All tack, rugs and grooming equipment should be restricted to individual horses and sterilised regularly by washing in a fungicidal or sporocidal disinfectant such as

the halogenated peroxygen agents (Virkon)⁵ or quaternary ammonium compounds (Trigene)⁶.

- 6) Environmental limitation of fungal spores is difficult but can be achieved with antifungal disinfectants either as washes or by fogging. Complete elimination from an infected premises is probably unrealistic and hygiene then forms the basis of control and prevention of outbreaks.

Manufacturers' addresses

¹Pfizer UK, Sandwich, Kent, UK.

²Intervet, Milton Keynes, Buckinghamshire, UK.

³Janssen Animal Health, High Wycombe, Buckinghamshire, UK.

⁴Leo Pharmaceuticals, Princes Risborough, Buckinghamshire, UK.

⁵DuPont, Geneva, Switzerland.

⁶MediChem, Sevenoaks, Kent, UK.