Managing bacterial and fungal dermatological issues in horses

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DAVID RENDLE BVSc, MVM, CertEM(IntMed), DipECEIM, MRCVS explains why diagnosing the cause of bacterial and fungal skin conditions can be difficult and treatment requires consideration to avoid overuse of antibiotics

BACTERIAL and superficial fungal skin infections are common in horses. Accurate diagnosis of the infectious agent can be challenging, but is important in achieving a prompt and effective cure while preventing excessive and indiscriminate antimicrobial use.

Infectious disease commonly occurs secondary to, or in association with, other dermatological disease and investigation typically extends beyond attempts to isolate infectious agents.

Effective sampling in suspected cases

The skin is accessible and, therefore, an easy site to sample. However, superficial samples and swabs are also likely to contain contaminant and commensal bacteria, complicating the interpretation of results.

Where possible, the use of cotton-tipped swabs should be avoided and fluid or tissue samples collected in preference. Typically, the volume of sample collected on a swab is small and is further diminished by desiccation in transit, especially if appropriate transport media are not used.

On the rare occasions where vesicles or pustules are present, they should be aspirated directly

and the fluid submitted for culture and cytological examination. Cytology is often overlooked, but may provide valuable evidence of causative bacteria.

In cases of crusting dermatitis, samples should be collected from the underside or beneath the crust. Early lesions, which produce more exudate, provide the best opportunity for diagnosis. Crusts should be lifted and impression smears made from the underlying exudate or the underside of the crusts. Older, drier crusts may be macerated in a small volume of saline for cytological examination and culture. Histopathological examination of thick crusts may also be helpful.

Biopsies should always be considered, not only for bacterial culture, but also for histological examination. Biopsies enable samples from deeper tissues to be cultured and also provide a means of identifying other dermatological diseases that may underlie secondary bacterial or fungal infection.

Examination of hair samples is often performed to investigate the presence of dermatophytes, though fungal culture is the gold standard. Hair is typically plucked from the periphery of the lesion using haemostats and examined microscopically after digestion in 10 per cent potassium hydroxide to digest excessive keratinous material.

Dermatophytes are typically seen in clusters or extended chains at the hair surface. The presence of arthrospores should not be over-interpreted as being indicative of fungal infection, but it is suspicious and indicates exposure. Adhesive tape can also be used to collect hair samples and may enable examination of more diseased and brittle hairs than would be possible following collection with haemostats. Fungal culture may be performed on hair plucks or skin scrapings from the most recent lesions.

Staphylococcal infections

Staphylococci are common commensals of both skin and mucous membranes, but also have the capacity to be opportunistic pathogens. *S aureus* is the species most relevant to horses, while *S hyicus* and *S pseudintermedius* are more commonly associated with dermatological disease in pigs and dogs respectively, but have been identified as equine pathogens. The coagulase negative staphylococci are common commensals and rarely cause disease in immunocompetent animals. *S aureus* is a less common commensal, but is identified on the skin of some healthy horses (Weese and Yu, 2013).

Staphylococcal infection generally follows other skin trauma and/or systemic disease and may present as folliculitis, furunculosis or cellulitis. Lesions often occur beneath the saddle, girth or other items of tack, which presumably abrade the skin surface and provide a moist environment that facilitates bacterial replication and penetration into hair follicles and the surrounding tissue.

Early staphylococcal folliculitis is characterised by small (less than 5mm diameter) regions of erect

hair that may be more easily palpable than visible. These may spontaneously regress or can enlarge and result in discharging ulcers or pustules. Epidermal collarettes are occasionally seen.

As the lesions become more chronic and spread they result in an expanding area of alopecia with hairs that are easily epilated and the lesions can be mistaken for dermatophyte infection. If the infection extends beyond the hair follicles to surrounding tissue (furunculosis) then large ulcerated and crusting areas may become apparent and the skin may become nodular and/or develop draining tracts. Further extension of infection may result in cellulitis.

By contrast to folliculitis lesions caused by dermatophytes or dermatophilus, staphylococcal folliculitis/ furunculosis is typically very painful. Pruritus may also be a feature. Where self-trauma occurs as a result of pruritic skin disease, staphylococcal infection may result in pyoderma or impetigo that can compound the pruritus. On rare occasions staphylococcal infection may be limited to mucocutaneous junctions. Staphylococci are frequently implicated in pastern dermatitis, in which there may also be vasculitis and concurrent infection with other bacteria, fungi or *Chorioptes* mites.

The management of staphylococcal infections will depend on the chronicity and severity of the lesions. Tack, rugs and similar should not be used over the lesions and should be thoroughly disinfected. Lesions should be clipped to remove hair and debris to facilitate more effective topical treatment. Crusts should also be removed.

Superficial, localised infections should respond to daily two per cent to four per cent chlorhexidine, but a reasonable contact time is required – ideally 15 to 30 minutes (Weese and Yu, 2013).

Sedation is often required to effectively cleanse the lesions and analgesics may also be indicated. Silver sulfadiazine cream can be applied between washes. Deeper or more widespread lesions are likely to require systemic antimicrobial treatment.

Potentiated sulphonamides are typically effective and are an appropriate first line choice. Gentamicin is an effective, but less practical, alternative as it necessitates daily intravenous injection. Other options that should be restricted for refractory cases are erythromycin, enrofloxacin and rifampicin. Treatment should be continued two weeks beyond the point when lesions appear to be visually healed. Typically, treatment for a month will be required if lesions are superficial and two months or longer for deeper lesions.

When staphylococcal infection is suspected the potential for methicillin-resistant *S aureus* (MRSA) should be considered and basic infection control measures, particularly gloving and hand washing, should be observed. Fortunately, staphylococci are susceptible to most disinfectants.

Dermatophilosis (rain-scald)

Dermatophilus congolensis is a common cause of dermatological disease in horses that results in exudation and, consequently, crusting lesions.

The disease typically occurs sporadically in horses that are immunocompromised, have existing skin lesions or are affected by persistent skin wetting.

D congolensis has limited capacity to establish infection on intact skin even if present in very large quantities (Scott and Miller, 2003). The epidemiology of *D congolensis* has not been investigated, but the bacteria may be isolated from healthy and asymptomatic carriers may provide a reservoir for infection. Transmission may be direct or via fomites.

The distribution of lesions is determined by the distribution of the underlying factors that enable the bacteria to colonise the skin; infection most commonly occurs along the back and over the rump in horses that are exposed to wet weather. Following infection, small papules and then pustules develop, which are frequently missed. With chronicity, increasing exudation results in the characteristic crusting that traps hair, producing the classic “paintbrush” lesions that are easily peeled away from the skin. In most cases, lesions are neither associated with pruritus nor overt pain.

Diagnosis is often made from the characteristic appearance of the lesions in the presence of known risk factors. Further evidence is obtained by performing cytological examination of impression smears from the underside of fresh crusts or examination of older crusts that have been macerated with saline. Chains of cocci are seen that often run parallel, producing the so-called “rail track” appearance. Confirmation of the diagnosis may be obtained by culture of crusts or by histology in which characteristic layering of parakeratotic stratum corneum, dried serum and degenerating neutrophils will be seen.

When dermatophilosis is diagnosed, consideration should also be given to potential underlying causes or other primary infectious processes.

Lesions may resolve spontaneously if the underlying causes are eliminated. Systemic treatment is rarely necessary because virtually all cases will respond to the topical treatment outlined for the treatment of staphylococcal dermatitis. If there is no response to appropriate management and topical treatment, then the diagnosis should be questioned and further investigations should be performed to investigate other primary or underlying causes. If systemic treatment is required then penicillin is highly effect tive. The organism is extremely durable in the environment and may survive within crust material for years (Scott and Miller, 2003).

Dermatophytosis (ringworm)

Dermatophytes of the *Microsporum* and *Trichophyton* genera are highly contagious causes of skin disease in horses.

At an individual level infection tends to be self-limiting and is associated with minimal morbidity, but the rapid spread of cosmetic blemishes through a herd can cause disruption and have economic consequences.

The zoonotic potential of dermatophytes also needs to be considered. In horses, *T equinum* and *M equinum* account for most cases, but other *Trichophyton* and *Microsporum* species, including *T mentagrophytes*, *T verrucosum*, *T bullosum* and *M gypseum,* have also been reported to cause disease in horses. Infection typically occurs from other infected horses or via contact with infected tack, rugs or other equipment. Infection may also be acquired from other mammalian species or possibly clinically normal horses that are carriers (Moretti et al, 1998). Young or immunocompromised horses are at greater risk.

Following infection, spores (arthroconidia) germinate and invade the keratinised layers of the skin and hair over a period of around three days. Clinical signs are likely to be observed around a week later (Weese and Yu, 2013). Dermatophytes produce keratinases, which digest hair and skin resulting in small circular areas of scaling and alopecia. Infection spreads in an irregular and unpredictable manner. Healing and hair regrowth may occur following a cell-mediated immune response in the centre of larger, more chronic, lesions resulting in rings of infection.

Although most cases will exhibit the typical scaling alopecic lesions, the appearance of dermatophytosis can be highly variable and it should be considered for any superficial lesions where there is folliculitis or alopecia. Trichoscopy may reveal large numbers of dermatophytes in chains or clusters along the length of infected hairs. Culture of newly affected hair or scale using selective fungal media is the gold standard for diagnosis. Unfortunately, culture is slow and it may take up to two weeks for a positive diagnosis to be made.

Treatment for dermatophytosis may not be required because the condition will typically resolve in immunocompetent animals over a number of months. However, treatment is usually desirable to hasten resolution and limit disease spread and is often instigated on clinical suspicions before a positive laboratory diagnosis is made.

Enilconazole rinses are licensed for this purpose in horses and are effective if applied in accordance with the manufacturer’s instructions. Topical treatment generally suffices and no convincing evidence supports the use of systemic anti-fungal treatments such as griseofulvin.

In two poorly controlled studies in which griseofulvin was administered at the label dose of 10mg/kg/day for seven days, all horses improved, but recurrence was not uncommon (Harding, 1981; Hiddleston, 1970). The use of 100mg/kg/day has also been suggested, implying the label dose is not effective, and anecdotal experiences with the use of griseofulvin are disappointing (Scott and Miller, 2003; Weese and Yu, 2013).

Given the self-limiting nature of the disease, the efficacy of topical treatments and the greater

potential for adverse effects with systemic treatment there are rarely indications for the use of griseofulvin. In other species griseofulvin is teratogenic and causes abnormalities of spermatozoa.

Dermatophytes only spread through direct or fomite contact so isolation is effective in controlling disease transmission. Elimination from the environment can be challenging as spores will survive for months, if not years. Thorough cleaning of stables and equipment should be performed to remove organic matter and then a disinfectant such as household bleach at a 1:10 dilution (Weese and Yu, 2013) applied.

Streptococcal infections

Although typically associated with infections of the respiratory tract, *Streptococcus equi*, *S zooepidemicus* and *S equisimilis* have all been associated with dermatological infections in horses. Streptococci are a common cause of abscesses, especially in younger horses, but may also be responsible for folliculitis, furunculosis and cellulitis. Streptococci have consistent and predictable sensitivity patterns and treatment with a penicillin or potentiated sulphonamide is likely to be effective.

Less common infectious agents

Other bacteria that have been associated with dermatitis, lymphangitis or cellulitis include *Corynebacterium pseudotuberculosis*, *Arcanobacterium pyogenes*, *Actinobacillus equuli*, *Fusobacterium necrophorum*, *Pasteurella haemolytica*, *Rhodococcus equi*, *Actinomyces* species, *Nocardia* species and *Actinobacillus lignieresii*.

Subcutaneous abscesses and cellulitis caused by *R equi* may occur in the absence of the more common intra-thoracic or intra-abdominal lesions.

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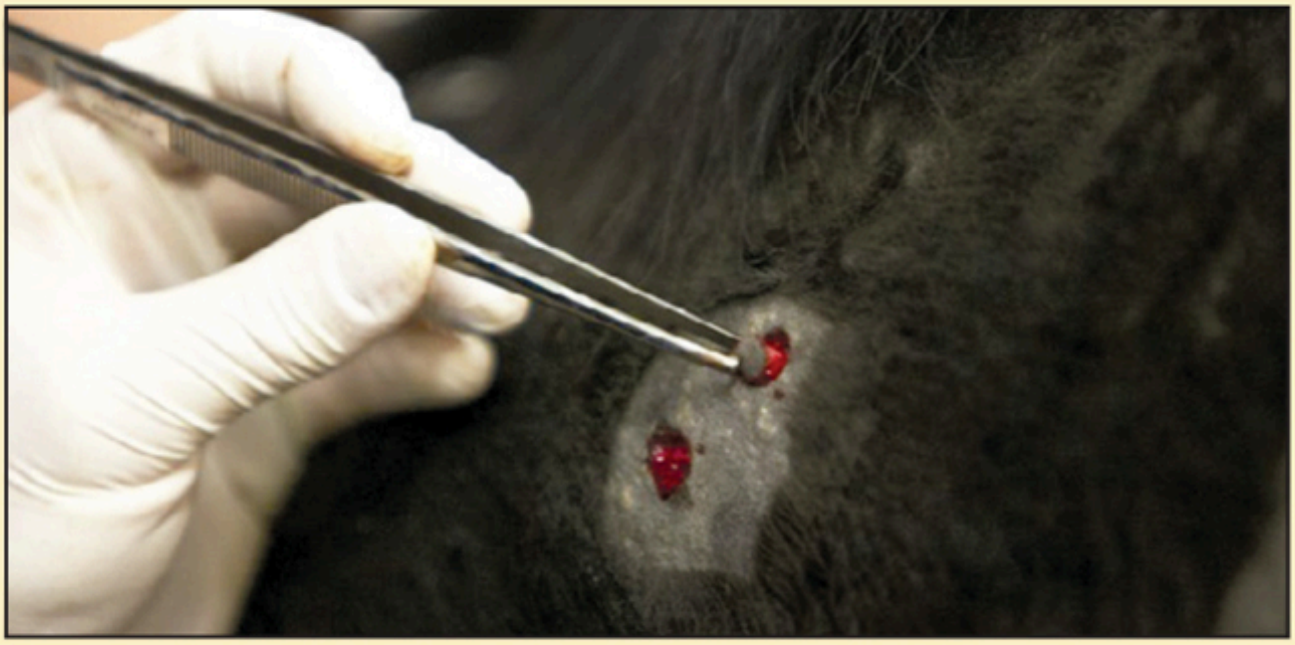
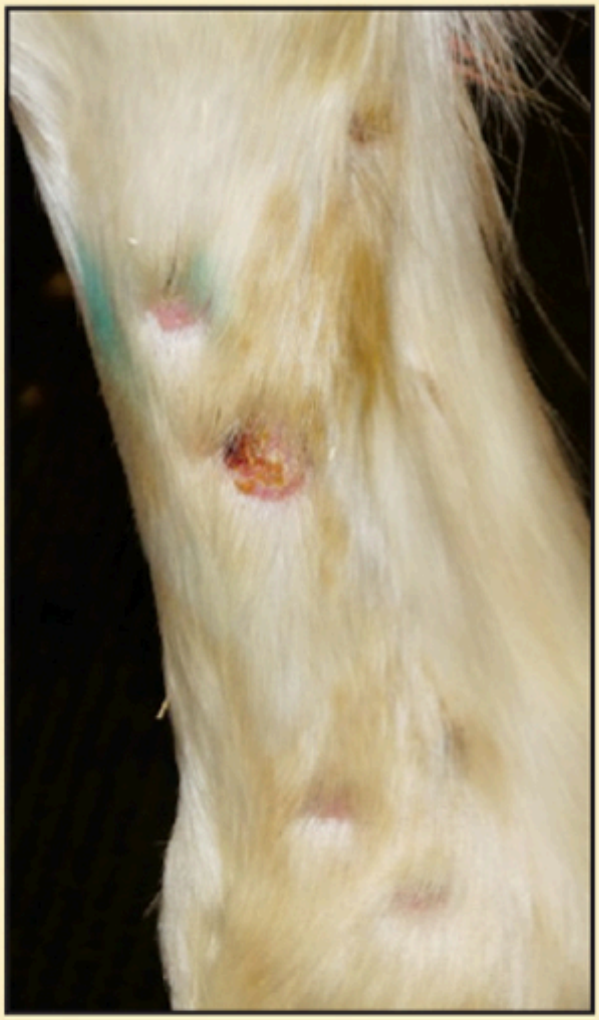
Although some infectious dermatological diseases have a typical clinical appearance, definitive diagnosis requires laboratory investigation. This is particularly important when the distal limb is affected because multiple agents are often involved.



Histological examination and culture of skin biopsies is valuable in confirming infectious disease

and identifying underlying disease that may predispose to infection.

Typical scaling alopecic dermatophyte lesions around the muzzle and eye of a horse.



Less typical dermatophyte lesions that were diagnosed on histology and later culture.