

An Overview of Dermatophilosis Infection among Animals

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Abstract

This infection of the epidermis, seen worldwide but more prevalent in the tropics, is also erroneously called mycotic dermatitis. The lesions are characterized by exudative dermatitis with scab formation. *Dermatophilus congolensis* has a wide host range. Among domestic animals, cattle, sheep, goats, and horses are affected most frequently, and pigs, dogs, and cats rarely. It is commonly called cutaneous streptothricosis in cattle, goats, and horses; in sheep, it is termed lumpy wool when the woolled areas of the body are affected. Infection in camel herds has been related to drought and poverty. Recent isolates from chelonids may represent a new species of *Dermatophilus*. It is also a common disease in farmed crocodiles. The few human cases reported usually have been associated with handling diseased animals.

Introduction

D. congolensis is a gram-positive, non-acid-fast, facultative anaerobic actinomycete. It is the only currently accepted species in the genus, but a variety of strains can be present within a group of animals during an outbreak. It has two characteristic morphologic forms: filamentous hyphae and motile zoospores. The hyphae are characterized by branching filaments (1–5 μm in diameter) that ultimately fragment by both transverse and longitudinal septation into packets of coccoid cells. The coccoid cells mature into flagellated ovoid zoospores (0.6–1 μm in diameter).

The natural habitat of *D. congolensis* is unknown. Attempts to isolate it from soil have been unsuccessful, although it is probably a saprophyte in the soil. It is believed to be spread by direct contact between animals, through contaminated environments, or possibly via biting insects. It has been isolated only from the integument of various animals and is restricted to the living layers of the epidermis. Asymptomatic chronically infected animals are considered the primary reservoir.

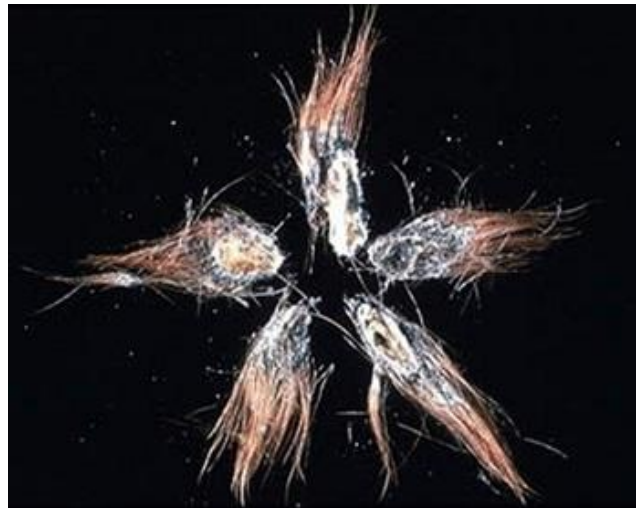


Fig.1. *Dermatophilus congolense* infection, horse

Factors such as prolonged wetting by rain, high humidity, high temperature, and various ectoparasites that reduce or permeate the natural barriers of the integument influence the development, prevalence, seasonal incidence, and transmission of dermatophilosis. Ticks and lice are major predisposing factors in cattle and sheep, respectively.

The organism can exist in a quiescent form within the epidermis until infection is exacerbated by climatic conditions. Epidemics usually occur during the rainy season. Moisture facilitates release of zoospores from preexisting lesions and their subsequent penetration of the epidermis and establishment of new foci of infection. High humidity also contributes indirectly to the spread of lesions by allowing increases in the number of biting insects, particularly flies and ticks, that act as mechanical vectors. Shearing, dipping, or introducing an infected animal into a herd or flock can spread infection.

Dermatophilosis is contagious only in that any reduction in systemic or local skin resistance favors establishment of infection and subsequent disease.

Pathogenesis:

To establish infection, the infective zoospores must reach a skin site where the normal protective barriers are reduced or deficient. The respiratory efflux of low concentrations of carbon dioxide from the skin attracts the motile zoospores to susceptible areas on the skin surface. Zoospores germinate to produce hyphae, which penetrate into the living epidermis and subsequently spread in all directions from the initial focus. Hyphal penetration causes an acute inflammatory reaction. Natural resistance to the acute infection is due to phagocytosis of the infective zoospores, but once infection is established, there is little or no immunity. In most acute infections, the filamentous invasion of the epidermis ceases in 2–3 wk, and the lesions heal spontaneously. In chronic infections, the affected hair follicles and scabs are sites from which intermittent invasions of noninfected hair follicles and epidermis occur. The invaded epithelium cornifies and separates in the form of a scab. In wet scabs, moisture enhances the proliferation and release of zoospores from hyphae. The high carbon dioxide concentration produced by the dense population of zoospores accelerates their escape to the skin surface, thus completing the unique life cycle.

Clinical Findings:

Dermatophilosis is seen in animals at all ages but is most prevalent in the young, in animals chronically exposed to moisture, and in immunosuppressed hosts. Lesions on a host can vary from acute to chronic. Age, sex, and breed do not seem to affect host susceptibility. Pruritus is variable. Most affected animals recover spontaneously within 3 wk of the initial infection (provided chronic maceration of the skin does not occur). In general, the onset of dry weather speeds healing. Uncomplicated skin lesions heal without scar formation. These infections usually have little effect on general health. Animals with severe generalized infections often lose condition, and movement and prehension are difficult if the feet, lips, and muzzle are severely affected; these animals are often sent to slaughter as incurable. Deaths occasionally occur, particularly in calves and lambs, because of generalized disease with or without secondary bacterial infection and secondary fly or screwworm infestation. The primary economic consequences are damaged hides in cattle, wool loss in sheep, and lameness and loss of performance in horses when severely affected around the pastern area. Cattle with lesions covering >50% of the body are likely to become seriously ill.

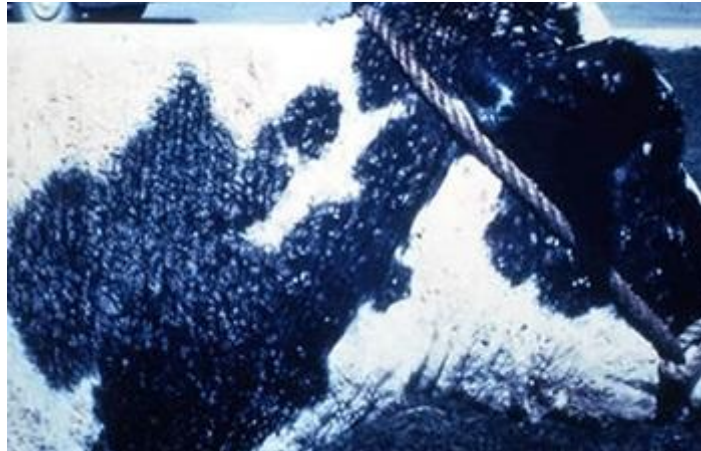


Fig.2. *Dermatophilus congolense* infection, cow

Lesions:

Distribution of the gross lesions on cattle, sheep, and horses usually correlates with the predisposing factors that reduce or permeate the natural barriers of the integument. In cattle, the lesions can be observed in three stages: 1) hairs matted together as paint-brush lesions, 2) crust or scab formation as the initial lesions coalesce, and 3) accumulations of cutaneous keratinized material forming wart-like lesions that are 0.5–2 cm in diameter. Typical lesions consist of raised, matted tufts of hair. Most lesions associated with prolonged wetting of the skin are distributed over the head, dorsal surfaces of the neck and body, and upper lateral surfaces of the neck and chest. Cattle that stand for long periods in deep water and mud develop lesions in areas such as skin folds of the flexor surfaces of the joints. Dairy cows may present with papular crusted lesions on the udder. Lesions initiated by biting flies (mechanical vectors) are found primarily on the back, whereas lesions induced by ticks are primarily on the head, ears, axillae, groin, and scrotum.

Chronic lumpy wool infections are characterized by pyramid-shaped masses of scab material bound to wool fibers. The crusts are primarily on the dorsal areas of the body and prevent the shearing of sheep; spiny plants often predispose to lesions on the lips, legs, and feet. Strawberry footrot is a proliferative dermatitis affecting the skin from the coronet to the carpus or hock.

Lesions on horses with long winter hair coats are similar to those of cattle, developing with matted hair and paint-brush lesions leading to crust or scab formation with yellow-green pus present under larger scabs. With short summer hair, matting and scab formation is uncommon; loss of hair with a fine paint-brush effect can be extensive. Persistent wetting of pasterns in wet yards, stables, or at pasture leads to lower limb infection; white legs and the white-skinned areas of the lips and nose are more severely affected. Generalized disease is also associated with prolonged wet weather. Outbreaks occur on farms with previously affected horses.

Histopathologic examination reveals the characteristic branching hyphae with multidimensional septations, coccoidal cells, and zoospores in the epidermis. The organisms are usually abundant in active lesions but can be sparse or absent in chronic lesions.

Diagnosis:

Presumptive diagnosis depends largely on the appearance of lesions in clinically diseased animals

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and demonstration of *D congolensis* in stained smears or histologic sections from scabs. A definitive diagnosis is made by demonstrating the organism in cytologic preparations, isolation via culture, and/or via skin biopsy. An indirect fluorescent antibody technique and a single dilution ELISA test have been developed for large serologic and epidemiologic surveys. The most practical diagnostic test is cytologic examination of fresh crusts and/or impression smears of the underside of freshly avulsed lesions. Fresh crusts are minced on a glass microscope slide with a sterile scalpel blade in several drops of sterile saline. The slide is allowed to air dry and is then stained with a fast Giemsa or Romanowski stain. The organisms are seen under oil immersion as 2–6 parallel rows of gram-positive cocci that look like railroad tracks. Differential diagnoses include dermatomycoses in most species, warts and lumpy skin disease (see Lumpy Skin Disease) in cattle, contagious ecthyma (see Contagious Ecthyma) and ulcerative dermatosis (see Ulcerative Dermatitis of Sheep) in sheep, and dermatophytosis (see Dermatophytosis) and immune-mediated scaling diseases of horses (eg, pemphigus foliaceus).

Treatment and Control:

It was previously thought that because acutely infected animals usually heal rapidly and spontaneously, treatment was indicated only for cosmetic reasons in food-producing animals. However, in certain parts of the world, the disease is associated with significant morbidity and mortality, loss of body condition, decreased milk production, and increased somatic cell counts in milk. Treatment is recommended in horses because the lesions interfere with use and are painful. Organisms are susceptible to a wide range of antimicrobials: erythromycin, spiramycin, penicillin G, ampicillin, chloramphenicol, streptomycin, amoxicillin, tetracyclines, and novobiocin. Two doses of long-acting oxytetracycline (20 mg/kg) 1 day apart have shown to be curative in 85% of cattle and 100% of sheep, compared with cure rates of 71% in cattle and 80% in sheep for a single dose. In food-producing animals, topical applications of lime sulfur are a cost-effective adjuvant to antibacterial therapy. Insecticides applied externally are frequently used to control biting insects.

In horses, the lesions should be gently soaked and removed. Topical antibacterial shampoo therapy is effective as adjuvant therapy. Chlorhexidine is recommended. Topical treatment with povidone-iodine is superior to parenteral oxytetracycline alone (100% and 66% effective, respectively).

Isolating clinically affected animals, culling affected animals, and controlling ectoparasites are methods used to break the infective cycle. Preventing chronic maceration of the skin and keeping the animals dry are important. Zinc levels should be checked in the feed of cattle, because outbreaks have been associated with zinc deficiencies.

Zoonotic Risk:

Dermatophilosis can be transmitted to people. Direct contact with an infected animal can lead to infections on the hands and arms. Affected animals should be handled with gloves, and thorough handwashing with an antibacterial soap is recommended after contact with an infected animal.

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