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A Case Report

Dermatophilus Infection in an Iowa Dairy Herd

Dennis D. Drager*
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Introduction

Infectious skin disorders can present the food animal practitioner with a diagnostic and therapeutic challenge. Rapidly spreading infectious skin disorders can cause significant morbidity and economic loss in closely confined animals. This report will discuss an outbreak of *Dermatophilus congolensis* in Iowa dairy cattle and will describe the diagnostic challenges.

Case Report

In early June, 1984, 350 registered 20-month-old Hostein heifers were purchased from various locations in the eastern and mid-western United States and were moved to a backgrounding farm in northeast Iowa. The heifers were to be pregnancy checked, vaccinated and prepared for export to Korea.

In mid-June, one heifer developed areas of raised flaking skin on the neck, shoulders and below the tail. The lesions ranged from 0.5 to 1.5 centimeters in diameter. They were amber-gray, circumscribed, raised lesions giving the skin a rough and bumpy appearance. Closer examination revealed tufts of hair matted together by hardened exudate. The tufts were easily removed, leaving a raw base exuding serum and blood. Over the next several days the lesions appeared to spread to other heifers. At this time insect bites were considered the cause and a commercial fly spray was used to decrease the fly population. Within 3 weeks similar lesions appeared on 30 to 40 animals in the herd. The heifers were not pruritic and remained clinically normal except for the skin lesions.

In late June, a visiting Korean inspector refused to allow the heifers to be imported unless the skin disease was diagnosed and controlled. *Dermatophilus* infection was confirmed at the Iowa State University Veterinary Diagnostic Laboratory using histopathology and bacterial culture of skin biopsies and skin dander from several infected cattle. Heifers with lesions were segregated from the herd and treated intramuscularly with 25 milliliters of Pen-Strep® twice daily for 3 days. The remainder of the herd received 2 injections of Pen-Strep® 12 hours apart. Within 3 days, most of the lesions were either resolving or healed. New cases did not develop and all the heifers were eventually exported. The treatment cost to the producer was approximately \$1000, compared to the potential loss of \$500,000 from loss of export sales.

Discussion

Dermatophilosis, caused by the actinomycete *Dermatophilus congolensis*, is an acute, sub-acute or chronic infection of the epidermis occurring in most mammals, including man.¹ Dermatophilosis was first confirmed in the United States in 1961.² The organism is a Gram-positive obligate parasite of the skin. Microscopically, *Dermatophilus* is a pleomorphic organism with branching septate filaments up to 6 micrometers long and 1 micrometer in diameter, which are often arranged in bundles. These branching septa give rise to parallel rows of coccoid spores.^{3,4} Under adverse environmental conditions, these coccoid spores can survive in dry scabs for up to 42 months.² Under favorable temperature and humidity, the dormant spores form infective motile zoospores. The zoospores are chemotactically responsive to carbon dioxide diffusing from skin. They germinate, sending hyphal branches into the epidermis. The hyphae may branch laterally

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and invade hair follicles.^{3,5}

Transmission of this disease can be direct from an infected to a susceptible animal.^{3,5,6,7} Transmission can also occur through infected water and grasses or by insects.⁸ *Dermatophilus congolensis* is unable to penetrate healthy skin, and therefore transmission of infective zoospores must be facilitated by minor trauma or excessive wetting.^{1,3,7} Prevention of spread is difficult because symptomless carriers and infected environments are hard to detect.^{5,6} Dermatophilosis is frequently seen in cattle, sheep, horses, goats; less often in pigs, dogs, cats; rarely in man and wild animals.^{3,9} It is generally considered a pathologic condition restricted to the living epidermis, although, several reports suggest *Dermatophilus* may be pathogenic in tissues other than skin. *Dermatophilus congolensis* has been cultured from lymph nodes of sheep, goats and cats, and has been demonstrated microscopically in non-skin tissues of several species.^{8,10} In cattle the disease is characterized by a non-pruritic, proliferative and exudative dermatitis with scab formation and matted hair.^{1,3} Acute lesions, as seen in the case presented, start as erythematous papules with crusts. Below the matted hair and crusts is an exudative purulent dermatitis. In acute cases, the crusts and hairs are easily removed, revealing an ulcerated surface oozing serum and blood. Chronic cases develop thick dry crusts, which can be several centimeters thick. Hyperpigmentation and alopecia are indicative of chronic infection.¹¹ Lesions vary in distribution and severity. Some animals may have small localized lesions; in others, the entire animal may be involved. During dry or cool weather, lesions in cattle may regress, while horses and sheep may suffer a chronic infection lasting months.^{2,3,7,9} Histopathologic examination of affected skin fixed in 10% neutral buffered formalin reveals morphologically distinct filamentous bacteria consistent with *Dermatophilus congolensis*.¹² The epidermis is congested, edematous, and infiltrated with neutrophils, resulting in a suppurative dermatitis. In chronic cases, extensive exudate is present along with proliferative changes including parakeratosis, hyperkeratosis, acanthosis and dermal sclerosis.^{3,12} Economic losses are incurred due to chronic unthriftiness, lowered production, increased cullings, rejection at slaughter, reproductive disturbance, lost export potential, and death.^{3,4,10,13} Morbidity

can range from 5 to 90% of the herd, depending primarily on weather conditions.³ Dermatophilosis in cattle usually occurs during or after a rainy period,^{4,9,14} such as the unusually wet weather experienced in Iowa in the Spring of 1984. Other management and environmental factors leading to increased morbidity in cattle include overcrowding, ectoparasites (especially ticks), malnutrition, and stress.^{3,5,9} Cattle of all ages and both sexes are equally susceptible.^{6,14} Mortality can approach 10%.³

Dermatophilosis lesions are similar to other skin problems and must be differentiated from dermatophyte infections, warts, photosensitization, skin parasites (such as mange) and fly bites.^{2,4,9} Tentative diagnosis is usually based on microscopic demonstration of characteristic Gram-positive branching filaments and spores.^{3,9} To demonstrate the organism, samples of the scabby lesions are stained with Gram or Giemsa stain and examined microscopically. Alternately, impression smears of the bleeding surfaces after removing the scab can be stained with any Wrights or Giemsa stain to demonstrate typical bacterial forms.¹ To confirm the diagnosis, crusts and dislodged hair are cultured by: a) placing the debris in sterile distilled water for 3.5 hours at room temperature; b) placing under carbon dioxide for 15 minutes; c) removing loopfuls from surface of water and inoculate onto blood agar supplemented with polymixin B sulphate.^{9,15} *Dermatophilus* forms hemolytic, yellow, raised, rough, adherent colonies on blood agar incubated under 10% carbon dioxide at 37 degrees centigrade.^{10,15}

Due to limited success with topical therapy, parenteral antibiotics are preferred.¹³ Recommended treatment is intramuscular injection of penicillin and streptomycin either as a single dose of 70,000 IU penicillin and 70 mg streptomycin per kg body weight, or 5 daily injections of 5000 IU penicillin and 5 mg streptomycin per kg. Resistant cases may be treated for 5 days with tetracyclines at therapeutic levels.⁴ In the case presented, clinical remission was dramatic following treatment. Most of the heifers recovered within 3 days following 2 injections of Pen-Strep.[®] Control measures should also include isolating affected animals from the herd, reducing overcrowding and other forms of stress, controlling ectoparasites, and maintaining an adequate plane of nutrition.

Although experimental vaccines have been tested,¹⁶ no vaccine has proven satisfactory under field conditions. Since recovery from infection does not prevent reinfection, it is unlikely that a vaccine would be protective.³

Dermatophilosis can be a devastating, debilitating disease of high economic importance worldwide. To prevent losses, the food animal practitioner must be familiar with the clinical signs of *Dermatophilus*. Diagnosis must be prompt and treatment aggressive to decrease the spread of infection. As seen in the case presented, accurate diagnosis and treatment can result in rapid recovery and prevent substantial economic loss.

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Junior Pharmaceutical Trip

by Mike Koob*

Forty-two members of the class of 1986, 15 spouses, and clinician Dr. James Noxon journeyed to Kalamazoo, Michigan January 10-12, 1985 to visit the Upjohn Company. Upjohn representatives Bernie Keene and Joe Felker joined the group leaving via chartered bus at 6:00 A.M. Jan. 10. After 10 hours of "normal midwest winter driving conditions," we were graciously welcomed into Kalamazoo at the Sheraton Inn and treated to a much-welcomed dinner. That evening, some took advantage of free movie passes, the pool, the sauna, or the bar.

Following a delicious breakfast at the hotel, the group was split up, half to visit the animal research farm, and half to tour the huge production plant. Lunch at the production plant followed, after which each group switched

tours, returning to the Sheraton by mid-afternoon.

After a well-attended open bar and a massive steak banquet, the bus carried most of the group to "Stan and Ollie's," a local watering hole/dancing establishment. Festivities continued long into the evening back at the motel. The 9:00 A.M. breakfast and subsequent departure were much too early for some.

The Upjohn photographer was ill during our visit, and thus, an "official" group picture was not taken. However, interested persons should contact Dr. Noxon for interesting photos of some of the group members, and vice versa.

We would like to thank the Upjohn Company for the friendship and hospitality shown to us during the trip. A special thanks is extended to Upjohn reps Joe Felker and Bernie Keene.

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