

## Occurrence of dermatomycosis (ringworm) due to *Trichophyton verrucosum* in dairy calves and its spread to animal attendants

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### ABSTRACT

Persistent dermatomycosis (ringworm) caused by *Trichophyton verrucosum* affected 20 dairy calves aged between 3 months and 1 year and housed together. The infection also spread to 2 animal attendants working among the calves. The major clinical lesions observed on the affected calves were extensive alopecia and/or circumscribed thick hairless skin patches affecting the head, neck, flanks and limbs. The observed lesions persisted for more than 17 weeks and most of the calves did not respond to topical treatment with various anti-fungal drugs within the anticipated period of 9 weeks. Two animal attendants developed skin lesions that were circumscribed and itchy and there was good response to treatment following the application of anti-fungal skin ointment. Although ringworm in dairy animals in Kenya has not previously been associated with spread to humans, the potential is evident from this report.

**Key words:** bovine, ringworm, zoonosis.

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### INTRODUCTION

*Trichophyton verrucosum* and *Trichophyton mentagrophytes* are the major causes of dermatomycosis (commonly known as ringworm) in cattle in many parts of the world<sup>1,8,11,13</sup>. The infection is mainly spread by contact between infected and susceptible animals or via a contaminated environment such as bedding and walls<sup>13</sup>.

High prevalence of dermatomycosis during winter has been attributed to the accumulation of infective material during this period<sup>1</sup>. In tropical regions like in Africa, where cattle are raised on open pasture for most of the year, the prevalence of the disease is low<sup>13</sup>.

Calves are more susceptible to ringworm infection than older animals<sup>5,8</sup>. In cattle the lesions are most commonly found on the neck, head and perineum and consist of heavy, grey-white crusts raised perceptibly above the skin, or simply alopecia<sup>12,13</sup>.

Transmission of ringworm-causing organisms from infected animals to people has been reported in the

past<sup>1,4,7,9,11,12</sup>, and infected animals may act as reservoirs of human infections<sup>8</sup>.

In Kenya, the incidence of cattle ringworm and the extent to which zoonotic dermatomycosis occurs have not been documented. However, it is estimated that human ringworm infections account for approximately 18–25 % of all human skin conditions in Kenya (H W Waweru, Medical School, University of Nairobi, pers. comm., 1998).

This paper reports a persistent outbreak of ringworm due to *Trichophyton verrucosum* that occurred in 20 dairy calves aged between 3 months and 1 year, and the subsequent transmission of the infection to 2 adult male animal attendants. The zoonotic nature of the infection demonstrates the potential for animal-derived ringworm in humans in Kenya, and indicates the need for an integrated approach to control of ringworm infections. The need to determine the incidence and the importance of cattle-derived ringworm infections in people in Kenya and elsewhere is highlighted in this paper.

### CASE HISTORY

The disease outbreak was reported in February 1997, during the dry season, on a large-scale dairy farm in Kiambu District, approximately 20 km west of Nairobi, Kenya. Some bull calves that had

been weaned over the previous few months had been confined and fed together in permanent concrete houses. Within a period of approximately 2 months in confinement, an outbreak of ringworm was reported and 20 calves aged between 3 months and 1 year were affected.

The lesions observed on the calves were confined to the skin and varied in severity from one calf to another. In some of the calves, the lesions observed were mild skin scales and loss of hair, but most of the calves had circumscribed, thick, hairless skin patches covered with asbestos-like crusts. The skin lesions were confined to the head and neck in some calves, but were extensive in others and had spread to the flanks, rump and limbs, affecting nearly the entire skin surface.

Mixed skin scrapings were collected using a scalpel blade following mild cleansing of the affected area with 70 % alcohol. The samples were later transferred to thiamine-enriched Sabouraud's dextrose agar plates containing no antibiotics and were incubated in the laboratory at room temperature for several weeks as described by the American National Research Council<sup>10</sup>. After several weeks of incubation, the adverse of the colony was flat, grey-white and slightly downy and the reverse was pinkish in colour. Smears were prepared from the aerial portion of the culture for microscopic examination using 10 % potassium hydroxide and for staining with lactophenol cotton blue. Microscopic examination revealed antler-like branching hyphae and chlamydospores ranging between 5–10 µm in diameter and arranged in linear series. No other spores were observed.

Two animal attendants who were working among the calves during the outbreak developed circumscribed itchy skin lesions on the hands. These were not typed but all circumstances suggested that the ringworm had originated from the cattle.

During the course of the outbreak, topical treatment was applied to the calves, using tincture of iodine and Defungit® (bensuldazic acid, Hoechst, Germany).

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After 17 weeks of medication, 16 calves with severe infection were slaughtered, as the medication seemed not to affect the course of the disease, while 4 responded to treatment and were healed. The 2 workers responded well to treatment that consisted of application of Gesten (Clotrimazole) (Gesto Pharmaceuticals, Kenya) anti-fungal ointment. After disposal of the calves, the calf houses were cleaned and disinfected with a solution of 2.0 % formaldehyde and 1.0 % caustic soda.

## DISCUSSION

An outbreak of a zoonotic form of ringworm on a large-scale dairy farm in Kiambu District, Kenya, is described. The disease was severe in calves aged between 3 months and 1 year. Age-related susceptibility to ringworm infection has been reported previously<sup>5,8,11-13</sup>. The disease prevalence is reported to be higher in winter than in summer<sup>5</sup>. The present outbreak occurred during the dry season when the affected group of calves was placed in confinement to intensify feeding. The confinement of the calves may have acted as the predisposing factor for the outbreak, while close contact among the calves precipitated the spread of infection. The influence of weather was not considered to be important in this outbreak. Previous observations that the incidence of infection is higher in winter than in summer may be due to the effect of confinement *per se* facilitating the spread of the infection rather than to weather.

In Kenya, the dairy cattle herd is mainly kept by smallholders and animals are generally raised in an open system<sup>2</sup>. Open-grazing management reduces environmental contamination, resulting in fewer outbreaks. However, the problem could become important on large-scale dairy farms where calf raising is intensified. On such large-scale farms, regular and thorough disinfection of the premises may prevent outbreaks, as treatment alone may not solve the problem. The reproductive units of ringworm, the

arthrospores, can remain viable in the environment for a long time, especially in concrete-based cattle housing<sup>10</sup>. In the present outbreak the calves were housed in a concrete building and the poor response to treatment coupled with the longer than 9 weeks infective period was attributed to constant contamination of the building.

Clinical presentation alone is insufficient for diagnosis, which must be confirmed by culture and microscopic examination, as other conditions such as urticaria and bacterial dermatitis can be confused with ringworm infections<sup>6</sup>. The culture and microscopic characteristics of the fungus isolated in the current outbreak were similar to those described for *Trichophyton verrucosum*<sup>10</sup>, and confirmed the earlier clinical diagnosis.

Painful and itchy inflammatory skin reactions such as the 2 animal attendants developed on their arms are not a feature of the same infection in cattle. It has been suggested that the true hosts of *Trichophyton verrucosum* are cattle and that is why they exhibit a more stable host-parasite relationship than is usual in people<sup>9</sup>. The occurrence of animal-derived ringworm in people has been reported previously<sup>2,4,12</sup>, and the present study adds to the knowledge of the epidemiology of human ringworm infections.

In addition to the zoonotic nature of the outbreak, there was an economic implication, since the bull calves that were initially destined for sale were not available at the expected time. This resulted in financial loss in addition to costs incurred from treatment. Most calves were destroyed as they had deteriorated in body condition and were not responding to therapy.

This paper provides the first documented report on zoonotic ringworm infection in Kenya. The reported outbreak shows that there is a need for an integrated approach to the control of animal-derived ringworm infections by veterinarians, human medical practitioners and public health workers in Kenya.

As approximately a quarter of all human skin conditions in Kenya are due to ringworm infections (Waweru, pers. comm.), there is a need to determine the incidence and importance of cattle-derived ringworm infections. This report represents an initiative to determine the importance and extent of cattle-derived ringworm infections in humans in Kenya and other developing countries.

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