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

J K Wabacha\(^*\), G K Gitau\(^*\), L C Bebora\(^b\), C O Bwanga\(^a\), Z M Wamuri\(^b\) and P M F Mbithi\(^a\)

**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.


**INTRODUCTION**

*Trichophyton verrucosum* and *Trichophyton mentagrophytes* are the major causes of dermatomycosis (commonly known as ringworm) in cattle in many parts of the world\(^1,4,7,11,13\). The infection is mainly spread by contact between infected and susceptible animals or via a contaminated environment such as bedding and walls\(^1\).

High prevalence of dermatomycosis during winter has been attributed to the accumulation of infective material during this period\(^1\). 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\(^1\).

Calves are more susceptible to ringworm infection than older animals\(^5,8\). 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\(^12,17\).

Transmission of ringworm-causing organisms from infected animals to people has been reported in the past\(^4,7,5,11,12\) and infected animals may act as reservoirs of human infections\(^8\).

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\(^9\). 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 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 typical 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\(^5\) (bensulazid acid, Hoechst, Germany).
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initiative to determine the importance and extent of cattle-derived ringworm infections in humans in Kenya and other
developing countries.

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and Importance of cattle-derived ring-
worm infections (Waweru, pers. comm.),
skin conditions in Kenya are due to ring-
worm infections in humans in Kenya and other
developing countries.

DISCUSSION
An outbreak of a zoonotic form of ring-
worm 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 previously5,6,10. The disease
prevalence is reported to be higher in winter than in summer. 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.6
Open-grazing management reduces
environmental contamination, resulting
in fewer outbreaks. However, the prob-
lem 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 treat-
ment 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.5 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 insuffi-
cient 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.6 The
culture and microscopic characteristics of
the fungus isolated in the current out-
break were similar to those described for
Trichophyton verrucosum6, 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 Tricho-
phyton verrucosum are cattle and that is
why they exhibit a more stable host-
parasite relationship than is usual in
people.9 The occurrence of animal-
derived ringworm in people has been
reported previously5,6,10, and the present
study adds to the knowledge of the epi-
demiology of human ringworm infec-
tions.

In addition to the zoonotic nature of
the outbreak, there was an economic implica-
tion, since the bull calves that were
initially destined for sale were not avail-
able 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 docu-
mented report on zoonotic ringworm in-
fected in Kenya. The reported outbreak
shows that there is a need for an
integrated approach to the control of ani-
mal-derived ringworm infections by
veterinarians, human medical practitio-
ners and public health workers in Kenya.