

PREVALENCE AND DISTRIBUTION
OF RINGWORM BY *TRICHOPHYTON VERRUCOSUM* IN SHEEP
IN THE HIGH ATLAS OF MOROCCO

by

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Summary — In a mountainous region of the High Atlas in Morocco 11 farms consisting of 426 sheep were infected by *Trichophyton verrucosum*. Only the lambs below 10 months of age were affected. Rate of infection was from 8.3 to 50 percent (average 22 percent). The lesions were present on the head in 100 percent, on limbs in 92 percent, on neck, tail and perineal region in 52 percent and on the trunk in 42 percent of animals examined. None of the human beings in contact with infected animals developed ringworm.

KEYWORDS : *Trichophyton verrucosum*; Ringworm; Sheep; Morocco.

Introduction

The ringworm in sheep is considered to be a rare condition although outbreaks are reported from Egypt (Refai *et al.*, 1976; Abou-Gabal *et al.*, 1976; Foud *et al.*, 1977), South Africa (Scott, 1975) and France (Guilhon *et al.*, 1955; Guilhon & Obligi, 1956; Luffau, 1976). Cases are also reported from Britain (Pepin & Austwick, 1968), Germany (Kielstein & Weller, 1965), Turkey (Ilgaz, 1975), Somalia (Vanbreuseghem, 1967), India (Rajagopalan Nayar *et al.*, 1974), Russia (Sharapov, 1962) and Algeria (Catanei, 1931, 1939). The most commonly isolated fungus is *Trichophyton verrucosum* (Ainsworth & Austwick, 1973; Shreeve, 1976). Other species of dermatophytes occasionally recorded are *T. mentagrophytes* (Guilhon & Obligi, 1956; Sharapov, 1962; Kamyszek & Nowaczyk, 1966; Rajagopalan Nayar *et al.*, 1974; Ilgaz, 1975), *T. rubrum* (Kielstein & Weller, 1965; Ilgaz, 1975; Abou-Gabal *et al.*, 1976), *T. violaceum* (Kielstein & Weller, 1965), *T. quinckeanum* (Jakl, 1949), *T. pruinatum* (Catanei, 1931), *Microsporum canis* (Kuntze *et al.*, 1967), *M. gypseum* and *M. nanum* (Ilgaz, 1975).

Ringworm caused by *T. verrucosum* has recently been described from cattle (Pandey, 1979 a, b; Pandey & Cabaret, 1979) and goat (Pandey & Mahin, 1979) in Morocco. Keeping in view the rarity of ringworm outbreaks in sheep and absence of information on this condition in Morocco it was thought worth while to report the present work with special emphasis on the distribution of lesions on different parts of the body.

Material and Methods

Four hundred twenty six sheep of nondescript local race from 11 farms in the valley of Zaouya Ahansal, province of Azilal, Morocco, were examined for ringworm lesions. This region is situated at an altitude of 2,000 meters

in High Central Atlas mountains where the animals are kept in badly ventilated dark houses during the cold months of November to March. For the rest of the year the sheep run on pasture. The general condition of animals in winter is poor due to scarcity of food.

The animals were examined individually and samples of hair and skin scrapings from lesions were collected. They were examined microscopically in 10 per cent KOH and lactophenol. The cultures were made on Sabouraud's dextrose agar containing penicillin, streptomycin and cycloheximide, incubated at 25 °C and 37 °C for 4 weeks and identified (Vanbreuseghem, 1966).

The distribution of lesions was studied on 25 infected sheep. The whole body was divided into 19 parts. A part was marked positive whether one or more lesions were present and no attempt was made to count the number of lesions.

Persons in contact with infected animals, with particular emphasis on children, were also examined for any ringworm lesions.

Results

The prevalence of disease varied between farms from 8.3 to 50 per cent with an overall average of 22 per cent (table 1). Only the lambs between 3 to 10 months of age were infected. The typical circular ringworm lesions started on the head in most cases, which later extended to other parts of the body. In due course the adjacent lesions became confluent and presented large irregular patches of different sizes.

TABLE 1
Incidence of ringworm in sheep caused by *Trichophyton verrucosum*

Flock number	Animals examined	Animals infected	Percentage infected
1	100	30	30.0
2	30	14	46.7
3	30	5	16.6
4	63	7	11.1
5	30	7	23.3
6	60	5	8.3
7	20	5	25.0
8	30	4	13.3
9	21	5	23.8
10	30	5	16.6
11	12	6	50.0
Total	426	93	22.0

The distribution of lesions on body are shown in table 2. According to regions, head was infected in 100 per cent of cases, the limbs in 92 per cent, neck, tail and perineal region in 52 per cent and trunk in 42 per cent of cases. The intensity of body parts affected is presented in table 3. More than half of the animals had 5 to 8 parts affected and 5 of them had generalised infection.

TABLE 2
Different parts of body infected by *Trichophyton verrucosum* in 25 sheep examined

Parts	Number of sheep infected	Percentage of infection
Face	24	96
Ears	19	76
Around eyes	15	60
Muzzle	8	32
Poll	12	48
Intermaxillary space	6	24
Dewlap	6	24
Sides of neck	9	36
Shoulder	11	44
Flank	5	20
Back	4	16
Loins	10	40
Lumbar region	5	20
Belly	6	24
Sides of trunk	6	24
Tail	13	52
Perineal region	4	16
Fore legs	23	92
Hind legs	23	92
Generalised	5	20

TABLE 3
Number of body parts infected by *Trichophyton verrucosum* in 25 sheep

Number of parts infected	Number of sheep infected	Percentage
2 to 4 parts	4	16
5 to 8 parts	13	52
9 to 12 parts	4	16
17 to 19 parts	4	16

Microscopical examination revealed invariably spores of ectothrix megaspore type measuring 4 to 5 μ . Based on microscopical and cultural examinations the dermatophyte was identified as *Trichophyton verrucosum*.

None of the persons in contact presented ringworm lesions.

Discussion

This work confirms that, as far as we know, *T. verrucosum* is the only dermatophyte causing ringworm in ruminants in Morocco (Pandey, 1979 a; Pandey & Mahin, 1979). *T. verrucosum* is considered primarily a pathogen of cattle and it is presumed that other animals get contaminated through contact with infected cattle. In the present studies there was no indication that cattle were the source of outbreaks. Kielstein & Weller (1965) and Scott (1975) as well found that the sheep ringworm due to *T. verrucosum* could not be traced to have originated from cattle. Vanbreuseghem (1967) demonstrated *T. verrucosum* from goats and a sheep where contact with infected cattle was not evident.

Cases of ringworm in sheep and goat are known to occur in this area. As the spores of *T. verrucosum* can remain viable for over 4 years in infected materials of hairs and skin (Mc Pherson, 1957; Kachnic, 1970) the origin of the outbreak can be traced to the infected premises where animals are kept during winter with close contact between them. The poor nutritional conditions of winter might have also, favoured the establishment of disease.

The disease was encountered only in animals below 10 months of age. The age *per se* has no significant influence on the susceptibility to infection by *T. verrucosum*, at least what has been shown in natural and experimental studies in cattle (Pandey, 1979 a; Lepper, 1972). A lasting acquired immunity apparently has been demonstrated in cattle (Lepper, 1972) and it seems that a similar phenomenon might operate in sheep who have got previous experiences of infection by *T. verrucosum*.

Most authors consider the lesions of ringworm in sheep limited to head only (Shreeve, 1976; Luffau, 1976). In the present work the lesions were found all over the body although the areas covered with fleece were affected less frequently than the uncovered parts. In a natural outbreak of ringworm in cattle caused by *T. verrucosum* Pandey & Cabaret (1979) demonstrated that all parts of the body were suitable for the development of ringworm, as also shown experimentally by Lepper (1972). The differences in observed frequencies of parts affected are probably due to other factors such as presence or absence of fleece. As in cattle ringworm (Pandey & Cabaret, 1979), it seems that in sheep too the lesions are distributed on the body independent of each other at random and not in a centrifugal way from an initial lesion.

No human cases of ringworm contracted from infected sheep were observed although it would have been expected that at least some of the children in regular contact with sheep had contracted the disease. In his Somalian survey Vanbreuseghem (1967) reports kerion by *T. verrucosum* in two children in contact with goats and sheep infected with the same dermatophyte.

Prévalence et distribution de la teigne par *Trichophyton verrucosum* chez des moutons du Haut Atlas marocain.

Résumé — Dans le Haut Atlas marocain 11 fermes contenant 426 moutons furent infectées par *Trichophyton verrucosum*. Uniquement des agneaux de moins de 10 mois d'âge furent atteints. Le taux d'infection varia entre 8,3 et 50 p. cent (moyenne 22 p. cent). Les lésions étaient présentes à la tête dans 100 p. cent des cas, aux membres dans 92 p. cent, au cou, à la queue et au périnée dans 52 p. cent et au tronc dans 42 p. cent. Aucune personne en contact avec les moutons infectés ne contracta la maladie.

Prevalentie en distributie van tinea door *Trichophyton verrucosum* bij schapen uit de Marokkaanse Hoge Atlas.

Samenvatting — In de Marokkaanse Hoge Atlas waren 11 hoeven die samen 426 schapen hielden, besmet met *Trichophyton verrucosum*. Alleen schapen beneden de leeftijd van 10 maanden waren aangetast. De infectiegraad lag tussen 8,3 en 50 ten honderd (gemiddeld 22 ten honderd). De letsels waren aanwezig op de kop in 100 ten honderd van de gevallen, op de ledematen in 92 ten honderd, op de hals, staart en perineum in 52 ten honderd en op de romp in 42 ten honderd. Geen enkele persoon die in contact was geweest met de besmette schapen, liep de ziekte op.

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