

A severe outbreak of sarcoptic mange among goats naturally infected with a sheep strain of *Sarcoptes scabiei*

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RÉSUMÉ

IBRAHIM (K. E. E.), ABU-SAMRA (M. T.). — Grave foyer de gale sarcoptique chez des chèvres naturellement infectées avec une souche ovine de *Sarcoptes scabiei*. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (3) : 258-265.

Un grave foyer de gale sarcoptique est apparu chez 32 chèvres lors d'un essai d'alimentation. L'infection a été transmise par une brebis atteinte. Chez toutes les chèvres et la brebis, des escarres fissurées caractérisaient les lèvres inférieure et supérieure, le muffle, les joues, la face externe des oreilles, les jointures des genoux et des boulets. Sur le reste du corps des chèvres, une poudre épaisse blanc-châtre ou blanc-jaunâtre recouvrait les desquamations, les petites croûtes et les plis de la peau.

Des prélèvements des lésions chez les chèvres et la brebis contenaient de nombreux *Sarcoptes scabiei* à tous les stades. Les acariens de la brebis s'étaient bien implantés chez les chèvres et se reproduisaient activement.

Les modifications histopathologiques de la peau comprenaient une grave hyperkératose et acanthose. Des débris d'acariens apparaissaient sous les couches de kératine, et on observait une abcédation ainsi que de graves changements nécrotiques et dégénératifs.

C'est probablement la première fois que l'on signale la transmission naturelle de *Sarcoptes scabiei* de moutons à des chèvres.

Mots clés : Chèvre - Mouton - Gale sarcoptique - *Sarcoptes scabiei* - Soudan.

SUMMARY

IBRAHIM (K. E. E.), ABU-SAMRA (M. T.). — A severe outbreak of sarcoptic mange among goats naturally infected with a sheep strain of *Sarcoptes scabiei*. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (3) : 258-265.

A severe outbreak of sarcoptic mange occurred among 32 goats in a feeding trial. The infection was contracted from an infected ewe.

In all goats and the ewe, thick fissured scabs were characteristic of the lesions over the upper and lower lips, muzzle, cheeks, outer surfaces of the ears, knee and hock joints, and around the fetlocks and coronets. The lesions over the rest of the body of the goats were characterized by white or yellowish-white dense powdery coating of scales and small pieces of crusts and wrinkling of the skin.

Skin scrapings from the lesions in the goats and ewe contained numerous *Sarcoptes scabiei* mites of all stages. The mites from the ewe had become well established in the goats and were actively reproducing.

The histopathological changes observed in skin sections comprised severe hyperkeratosis and acanthosis. Mite sections were seen beneath the keratin layers and there was microabscessation and severe degenerative and necrotic changes.

This outbreak is probably the first record of transmission of *Sarcoptes scabiei* from sheep to goats under natural conditions.

Key words : Sheep - Sarcoptic mange - *Sarcoptes scabiei* - Sudan.

INTRODUCTION

Sarcoptes scabiei is a cosmopolitan species of mite which parasitizes domestic and wild animals as well as man (7, 8, 13, 18). The

mites from various species of hosts are very similar morphologically but differ physiologically. They are usually regarded as different biological races or even different species (6, 9, 18). However, the comparative study conduc-

ted by Fain (7, 8) on the genus *Sarcoptes scabiei* revealed that it contains only 1 valid but variable species.

KRAL and SCHWARTZMAN (13) reported that the incubation period of scabies depends on the mode and site of infestation, number and species of mite and on the host species. The incubation period of scabies was reported to be 3 to 5 weeks and 2 to 6 weeks by JACKSON *et al.* (10), and KRAL and SCHWARTZMAN (13), respectively.

The host specificity of the mite has been challenged and the mites have been transmitted from one species to another (6, 13, 18). However, KOTLÁN (12), and KRAL and SCHWARTZMAN (13), reported that non-specific mites cause only temporary lesions that disappear without treatment. KOTLÁN (12) stated that *Sarcoptes* might be transmitted to an unusual host in which it might burrow into the skin and set up a typical mange lesion. However, he (12) indicated that unless it could also reproduce and persist as a colony through a number of generations, it cannot be regarded as a true parasite on the new host. In contrast, FAIN (8) reported that the frequent interbreeding of the mite in zoologically remote mammals has, on the one hand, prevented speciation and, on the other hand, provided new genetic characters which have enhanced the adaptability of the mite to infest other hosts. In support to this view ABU-SAMRA *et al.* (1, 3) have successfully infected donkeys with *Sarcoptes scabiei* from goats (1) and goats with *S. scabiei* from sheep (3), and NAYEL and ABU-SAMRA (15) have successfully infected camels with a goat strain of *Sarcoptes scabiei* and goats with a camel strain of *S. scabiei*. They (1, 3, 15) reported that the experimentally produced lesions were severe with well established mites which were only destroyed after treatment.

The current report describes a severe outbreak of sarcoptic mange among goats. The infection was naturally contracted from an infected ewe.

MATERIALS AND METHODS

1. History of the outbreak

In an experimental farm (Halfaya, Khar-toum North), 32 male goats aged 6 to 8 months, weighing 15-20 kg and in good

bodily condition were used in a feeding trial on different rations (Table I). Before the start of the feeding trial, the goats were left for 4 weeks to acclimatize, during which period they were closely observed, examined for freedom from internal and external parasites and any other clinically detectable abnormality.

TABLE N° I-Feeds used for the fattening of the goats in the feeding trial

Feed composition	Percentage of feed ingredients			
	Animal group			
	1	2	3	4
Dura (Sorghum grains)	5	15	5	15
Molasses	30	20	30	20
Abu 70 (Sudan grass)	-	-	43	43
Groundnut hulls	43	43	-	-
Cotton seed cake	20	20	20	20
Vitamins and Minerals	2	2	2	2

For the purpose of the feeding trial the goats were randomly divided into 4 groups of 8 goats each. Each group was placed in a clean and disinfected shaded enclosure, erected from metal rails and water tubing (Fig. 1) and was fed on the ration under investigation (Table I).

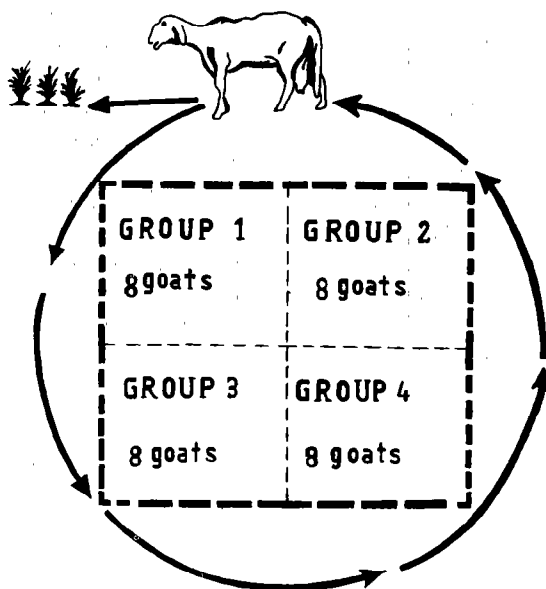


Fig. 1. — Diagram showing the layout of the enclosures accommodating the four groups of goats under the feeding trial and the possible mode of transmission of sarcoptic mange from the infected ewe to those goats.

Six weeks after the start of the feeding trial, the goats in group 2 showed signs of severe skin irritation manifested by the animals gnawing at, or rubbing their skin against the fences or scratching their body with their hind feet. A week later similar signs appeared among most of the animals in the other groups. Their hair coat was rough, covered with bran-like scales and showed large patches of alopecia.

A ewe belonging to one of the farm personnel was noticed to have similar lesions. The ewe was purchased in the open market and was brought to the farm, 3 weeks after the start of the feeding trial. It was not subjected to any clinical examination and was left loose to graze at the sides of the main water canal supplying the farm, without the knowledge of the farm manager.

The farm was visited immediately after the outbreak was reported, and 10 weeks after the start of the feeding trial. All goats in the feeding trial and the ewe were examined. Deep skin scrapings were collected in disposable plates, and skin biopsies were obtained and fixed in 10 p. 100 formal saline.

2. Laboratory investigations

Each specimen of skin scrapings was placed in a test tube, to which twice its volume of 20 p. 100 potassium hydroxide solution was added. The tubes were placed in a boiling water bath and were continuously shaken until complete digestion of the scrapings occurred. A drop of the digested material was then transferred with a dropper to a clean microscope slide, covered with a coverslip and examined. The mites in the skin scrapings of the goats and ewe were also checked for viability under a dissection microscope.

The skin biopsy specimens were processed for histological examination. Sections were cut at 5 μ m and stained with haematoxylin and eosin (H & E).

RESULTS

1. Clinical picture

1.1. Goats

The goats were emaciated, restless, and were continuously scratching and gnawing at their skin. All goats had lesions over the upper and

lower lips, muzzle, bridge of nose, around the eyes, on the cheeks and on the outer surfaces of the ears (Photo 1) and around the fetlocks and coronets. In 7 goats there were also lesions on the neck, shoulders (Photo 2), dorsum and flanks. In the remaining 25 goats the whole body was involved, but more extensive lesions were seen on the axillae (Photo 3), ventral aspect of the abdomen, the inguinal region and medial aspects of the thighs (Photo 4).

Two types of lesions were recognized :

1. Those over the upper and lower lips, muzzle, cheeks, outer surfaces of the ears, knee and hock joints and around the fetlocks and coronets were characterized by being depilated, covered with thick crust showing multiple crackings and fissures (Photo 1), and oozing a serohaemorrhagic exudate. These lesions seem to have been painful to the animals.

2. The lesions over the rest of the body were extensive. The skin was depilated and had white or yellowish-white powdery coating of scales and crusts (Photos 3 & 4). The thin hair coat around the lesions had minute branlike scales and small pieces of thick crusts. Palpation of the skin was not much resented and showed marked folding and wrinkling over loose areas (Photos 3 & 5).

In most of the goats the severe lesions over the lips and muzzle interfered with feeding and drinking.

1.2. Ewe

According to the history obtained from the owner ; the ewe was initially in good condition, but was noticed to rub its face and muzzle against its forelegs. At the time of purchase the layman-owner thought that these signs were only transient but few days later, he noticed that the skin over the face became depilated, hyperaemic and the animal became restless and was continuously rubbing its head against its forelegs and foreign objects in its surroundings.

At the time of examination the ewe was noticed to be emaciated, restless, and was persistently gnawing at its skin or scratching its body against the fences, trees and other objects in the farm. It had severe skin lesions involving the upper and lower lips, muzzle, bridge of nose, on the outer surfaces of the ears (Photo 5), on the legs and on the fetlocks and coronets. The affected areas were depi-



Photo 1. — Thick scab covering the lips, muzzle, bridge of nose and cheeks in a goat infected with sarcoptic mange. Note fissuring and cracking of the scab.

Photo 2. — A goat with moderate infection with sarcoptic mange in which the lesions involved the neck, shoulders, flanks and coronets.



Photo 3. — A goat with severe and extensive lesions of sarcoptic mange covering the whole body. Note severe lesions on the axillae, wrinkling of the skin and soiling of the surrounding hair with scales and small pieces of crusts.



Photo 4. — A goat with generalized infection with sarcoptic mange, showing severe lesions on the medial aspects of the thighs, abdomen and inguinal region. Note dense coating with scales, scruf and small pieces of crusts, wrinkling of the skin and soiling of the surrounding hair with scales and small pieces scab.

lated and covered with thick crusts which showed fissuring and cracking, rather like dry mud (Photo 5). Blood oozed from those



Photo 5. — A ewe infected with sarcoptic mange showing thick multifissured scab over the lips, muzzle, bridge of nose, cheeks and outer surfaces of the ears.

cracks and fissures and the skin was hard, leathery in consistency, and had an offensive smell.

2. Laboratory investigations

The skin scrapings from all the goats and the ewe contained numerous adults, nymphs, larvae, embryonated eggs and eggs of *Sarcoptes scabiei* mite (Photo 6). These mites were viable when examined under the dissection microscope.

Similar histopathological changes were seen in skin sections obtained from the lips and coronets of the goats and ewe. Except for the marked hyperkeratosis, thicker scab, more epidermal and microabscessation and marked proliferation of the connective tissue; the changes observed were similar in all respects to the skin sections prepared from the other parts of the body of the goats. Those changes comprised: hyperkeratosis, acanthosis and scab formation. The scab was infiltrated with degenerate polymorphs, and many mite sections were seen beneath the scab (Photo 7). The hair follicles were clogged with keratin, the blood capillaries were dilated, and marked haemorrhage was seen in the papillary layer and dermis. The epidermis and the dermis showed microabscessation and severe degenerative and necrotic changes. The epidermis and dermis were infiltrated with lymphocytes, eosinophils, macrophages and a few neutro-

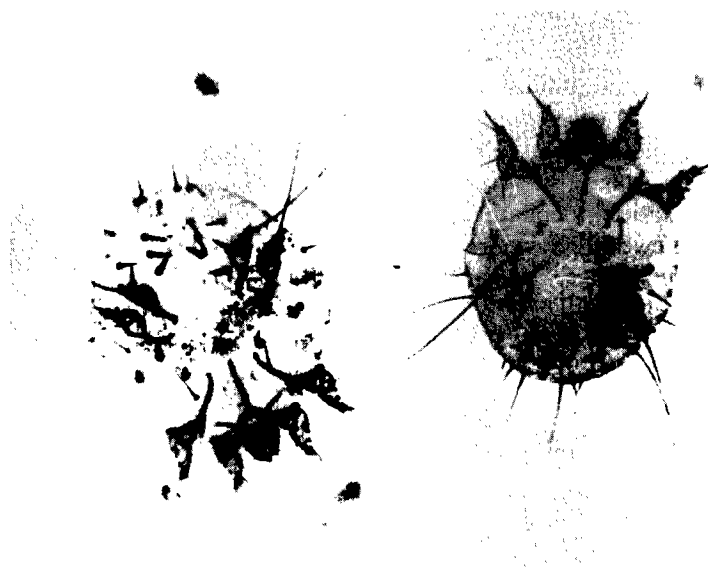


Photo 6. — *Sarcoptes scabiei* mites in skin scrapings from a goat infected with sarcoptic mange. 20 p. 100 KOH \times 125.

phils. The dermis showed proliferation of fibroblasts and the skin was thickened and packed with collagen.

DISCUSSION

Severe lesions of sarcoptic mange occurred among the goats which were purchased from premises with no previous history of sarcoptic mange infection. The initial signs of the disease appeared 6 weeks after the start of the feeding trial and 10 weeks after the goats were purchased. This period is much longer than the maximum incubation period reported for sarcoptic mange in goats (10, 13), and the likelihood that the goats were purchased during the incubation period of the disease is quite remote. Moreover, their freedom from external parasites was confirmed by the examination of skin brushings, collected before the start of the feeding trial.

No previous history of mange infection was encountered in the farm records, and except for the ewe which was brought without the knowledge of the farm manager; no other animals were kept in the farm during the feeding trial. This makes the possibility of the goats contracting infection from a source other than the ewe quite unlikely, because *Sarcoptes* mites were reported to be very susceptible to



Photo 7. — Section of skin from a goat infected with a sheep strain of *sarcoptes* mites, showing hyperkeratosis, acanthosis, severe degenerative changes and infiltration with inflammatory cells. Note mites beneath the keratin. H & E \times 100.

dryness and cannot live more than a few days off their host (6, 18).

The initial signs of sarcoptic mange among goats were noticed 3 weeks after the ewe was brought to the farm. The ewe was probably purchased in the early stages of infection, because the severe irritation, depilation and hyperaemia seen on the ewe's face were highly suggestive of sarcoptic mange, and ABU-SAMRA *et al.* (1, 2), BLOOD *et al.* (6), HOWELL *et al.* (9), JACKSON *et al.* (10) and SOULSBY (18) reported that the burrowing activities of the mite produces marked irritation causing itching and scratching which aggravates the condition. However, infection of the ewe with sarcoptic mange could have been confirmed had the layman-owner sought the help of a veterinarian or the farm manager, before bringing it to the farm.

The ewe was left loose to graze and transmission of infection to goats could have occurred through direct or indirect contact, when the ewe introduces its head through the metal partitions, or scratches its head against those partitions. This corroborates the statements of BLOOD *et al.* (6), HOWELL *et al.* (9), JACKSON *et al.* (10), KRAL and SCHWARTZMAN (13), LODHA (14), and SOULSBY (18) who reported that sarcoptic mange is transmitted by direct or indirect contact.

The goat is naturally a hardy animal, can survive under adverse environmental conditions and can produce under the lowest management standards (5). Although the goats described in the present report were fed on balanced rations supplemented with vitamins and minerals, yet they were found to be emaciated. This emaciation resulted from the severe lesions on the face and muzzle interfering with feeding and drinking. Probably this situation helped in the adaptation of the sheep strain of *Sarcoptes* in the new host (goat). This finding is in support of FAIN (8) who reported that adaptation of *Sarcoptes* might succeed more easily when a predisposing factor (decreased immunity, malnutrition,

other organic deficiency) is present in the new host.

The clinical picture of the lesions among goats was similar and in many animals was more severe and generalized than that described by ABU-SAMRA *et al.* (4), BLOOD *et al.* (6), JACKSON *et al.* (10), KALE and PANCHEGAONKAR (11), KRAL and SCHWARTZMAN (13) and SOULSBY (18).

The lesions observed on the upper and lower lips, muzzle, knee and hock joints and around the fetlocks and coronets were characterized by thick fissured scab, while the lesions seen over the rest of the body were characterized by a dense powdery coating of scales and small pieces of crusts. This difference could be attributed to the movement and wetting of the lips, muzzle and joints while drinking or sitting besides water troughs. This observation substantiates the finding of ABU-SAMRA *et al.* (3) who produced more severe lesions of sarcoptic mange in goats on moistened areas than on dry ones, and ABU-SAMRA *et al.* (2) and NAYEL and ABU-SAMRA (16) who noticed more severe lesions of sarcoptic mange over the lips and joints than on the rest of the body of sheep and camels naturally infected with sarcoptic mange, respectively.

The histopathological changes seen in skin sections from the goats and ewe were severe and similar to those described by ABU-SAMRA *et al.* (3, 4) and SHARMA DEORANI and CHAUDHURI (17).

In conclusion the outbreak described herein, could have been avoided if skin scrapings were collected from the suspect ewe before it was brought to the farm. However, this was not possible because the ewe was brought to the farm without the permission or knowledge of the farm manager. This outbreak proves that even under natural conditions, adaption of *Sarcoptes* mite from one host species to another can occur as was reported by FAIN (8) and proven experimentally by ABU-SAMRA *et al.* (1, 3) and NAYEL and ABU-SAMRA (15).

RESUMEN

IBRAHIM (K. E. E.), ABU-SAMRA (T.). — Foco grave de sarna en las cabras naturalmente infectadas con una cepa ovina de *Sarcoptes scabiei*. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (3) : 258-265.

Un foco grave de sarna apareció en 32 cabras durante un ensayo de alimentación. La infección fué transmitida por una oveja enferma. En todas las cabras y la oveja,

escaras fisuradas caracterizaban los labios inferior y superior, el hocico, las mejillas, el lado externo de las orejas, las coyunturas de las rodillas y de los menudillos. Sobre el resto del cuerpo de las cabras, un polvo espeso blanquecino o blanco-amarillento recubría las descamaciones, las pequeñas costras y los pliegues de la piel.

Muestras de las lesiones en las cabras y la oveja contenían numerosos *Sarcoptes scabiei* de todos los

estados. Los acáridos de la oveja estaban bien implantados en las cabras y se reproducían activamente.

Las modificaciones histopatológicas de la piel incluían una hiperqueratosis y acantosis. Pedazos de acáridos aparecían bajo capas de queratina y se observaban una formación de absceso y modificaciones graves necróticas y degenerativas.

Verosimilmente es la primera vez cuando se señala la transmisión natural de *Sarcoptes scabiei* de ovejas a cabras.

Palabras claves : Cabra - Oveja - Sarna - *Sarcoptes scabiei* - Sudán.

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