

## CUTANEOUS MYIASIS IN TWO SHEEP

J. STARIČ, T. ZADNIK, A. VIDRIH, A. VERGLEZ-RATAJ

Key words: veterinary medicine; cutaneous myiasis - therapy; *Phaenicia sericata*; sheep

Two Jezersko Solčavska sheep were brought to the hospital because of deep and smelly cutaneous lesions on their hindquarters. A physical examination of the animals revealed necrotized, moist, smelly and darkly discoloured skin without wool. The affected areas of the hindquarters contained many tiny cavities and a few bigger ones that reached the underlying musculature. By applying pressure to the affected skin, greyish yellow 1-cm long fly maggots, tapering towards the mouth, began to exit the cavities. The maggots were microscopically examined and identified as *Phaenicia sericata* Meig. (also known as *Lucilia sericata* Meig.), the greenbottle fly, and it was determined that these were cases of flystrike. After cleaning and disinfecting the cutaneous lesions, antiparasitic medications were applied topically and systemically, and because of the poor clinical status of the sheep they were also treated systemically with antibiotics. After 4 days of therapy the sheep were discharged. Information from the field indicates that cases of flystrike are not uncommon in Slovenia.

## PRIMER KOŽNE MIAZE PRI DVEH OVCAH

Ključne besede: veterinarska medicina; kožna miza - terapija; *Phaenicia sericata*; ovce

Dve ovci jezersko solčavske pasme sta bili pripeljani na kliniko zaradi smrdečih in globokih kožnih sprememb na korenu repa. Pri kliničnem pregledu smo na področju korena repa in prvih repnih vretenc ugotovili nekrotizirano, vlažno in smrdečo kožo črne barve, brez dlake, v njej pa je bilo veliko drobnih in nekaj večjih lukenj, ki so segale do mišičnine. Predvsem iz večjih lukenj so ob pritisku začele izhajati številne ličinke, dolge do 1 cm, sivkastorumenkaste barve, ki so se ožile od zadka proti koničastemu sprednjemu delu. Pregledali smo jih mikroskopsko in ugotovili, da gre za ličinke muhe *Phaenicia sericata* Meig. Nekateri avtorji jo imenujejo tudi *Lucilia sericata* Meig. Ta izvid nam je potrdil, da gre za kožno miazozo.

---

Received: May 5, 2002.

Address of authors: Jože Starič, DVM, Dr. Tomaž Zadnik, Assist. Prof., DVM, Clinic for Ruminants, Veterinary Faculty, Cesta v Mestni log 47, 1000 Ljubljana, Prof. Dr. Anton Vidrih, Biotechnical Faculty, Jamnikarjeva 1, 1000 Ljubljana, Aleksandra Vergles Rataj, M.Sc., DVM, Institute of Microbiology and Parasitology, Veterinary Faculty, Cesta v Mestni log 47, 1000 Ljubljana, Slovenia.

Po očiščenju kožnih sprememb smo ovci površinsko in sistemsko zdravili z antiparazitikoma. Ker sta bili tudi splošno prizadeti in sta imeli povišano telesno temperaturo, smo ju zdravili tudi z antibiotikom. Domov smo ju odpustili po štirih dneh. Po informacijah s terena naj bi bila kožna miza pri ovcah v Sloveniji pogost pojav.

### Introduction

Cutaneous myiasis is caused by many species of fly from the family *Calliphoridae*. They are divided into a primary species, which are able to initiate the disease, and a secondary species, which require a previous infestation of the host by a primary species (1). The secondary species and new waves of the primary species are attracted to sheep with skin lesions caused by larvae of the primary species, primarily by the odour that is emitted (2, 3, 4). These flies are facultative parasites, which means that their maggots can develop off the host on cadavers and manure. The maggots of the species *Lucilia cuprina* are an exception and live almost exclusively as parasites. This species is thereby considered an obligate parasite by many authors (1, 3). The main primary species in central and western Europe are *Phaenicia sericata* (also known as *Lucilia sericata*) and *Lucilia cuprina* (which is the most important causative agent of cutaneous myiasis in subtropical regions). The most common secondary species are *Calliphora erythrocephala*, *C. vomitoria* and *Phormia terranova* (1, 2, 3, 5, 6). In southern and eastern Europe the species *Wohlfahrtia magnifica*, from the family *Sarcophagidae*, is also a significant causative agent of wound myiasis (6).

Myiasis caused by the obligate parasitic fly maggots of the Asian and African species of *Chrysomya bezziana* fly or the American species *Cochliomyia hominivorax*, which parasitize on mammals (including humans"zoonosis) and birds is also possible due to the increasing frequency of animal transportation to and across Slovenia. Maggots of these species are also called screw worms and are the cause of large losses of farm animals. These two species are on the B list of the OIE International Animal Health Code (7).

There are many written reports emphasising the large losses caused by cutaneous myiasis in sheep breeding countries, particularly in South Africa and Australia where the biggest losses are suffered. It is estimated that in Australia 3,000,000 sheep die because of cutaneous myiasis each year (8) and sheep breeding in some areas of South Africa and Australia has been stopped because of it. Among all the diseases of sheep in New Zealand cutaneous myiasis causes the biggest losses (1). The prevalence of cutaneous myiasis in England and Wales is estimated at 1.6 % of sheep, of which 12,000 die each year (9). Besides mortality, the disease causes other financial loss as it also affects wool production, animal growth and results in additional expenses from its prevention and cure.

## Case Report

### *Owner's complaint*

Two sheep and their lambs were brought to the clinic on 24 October 2001 by their owner. He told us that the sheep, along with 13 others, had returned a few days beforehand from the vicinity of Lake Cerknica where they were in a flock of 250 sheep in a summer pasture community. One sheep had lambed 10 days earlier and had 2 male lambs and the other had just lambed for the first time and had a one-month-old male lamb.

When the sheep were brought home the owner noticed that they were restless and that they were not grazing nor caring for their lambs well. The owner also noticed that they had dirty wool on their heads and they were biting themselves on the hindquarters.

As a result the owner examined the sheep and found that they had serious skin lesions, with many worm-like organisms, in the area around the base of the tail. The affected area also had a distinct rotting odour. Because the skin lesions were so serious, the owner decided to bring his sheep to the clinic.

### *Physical examination*

A physical examination of the sheep found that they were in good breeding condition. Their fleeces were unshorn, dense, humid and a little dirty on the surface. Both sheep were depressed but they were also responsive, had healthy and well kept claws and well developed skin folds by the vulva. The sheep with twins (sheep A) had a massive purulent vaginal discharge that jetted if the caudal part of the abdominal wall was manually pressed from both sides. A vaginal examination found the cervix opened to the approximate width of a finger. Both sheep were also tachycardic (above 90 beats per minute), tachypnoeic (above 80 breaths per minute) and febrile (body temperature above 40 °C).

During a detailed examination of the skin we found necrotized, moist, black skin with many small holes and few larger ones in the breech area. On each side of the tail there were one to two deeper ulcerations that, on the sheep with one lamb (sheep B) reached the muscular tissue. On the dorsal part of the tail, at the level of third tail vertebra, sheep A had one large area of ulceration measuring 4 x 3 cm. There was no wool on the wound and the wool surrounding this area was matted and dirty. In the holes in the skin, especially the larger ones, there were many fly maggots that tapered towards the mouth and ranged from a few mm to 1.3 cm in length. They were a greyish, yellow white colour with dark mouth apparatus and they moved intensely when disturbed. The area 10 to 15 cm around the skin lesions was erythematous, swollen and had a strong rotting odour. It was also infested with maggots although there were no holes drilled into the skin.

In the fleece on the sacral and caudal parts of the lumbar area we found many nests, which were round and approximately 1 cm in diameter and full of fly maggots. Some of the nests had reached the skin causing erythema although there were no obvious physical lesions that would indicate active burrowing of maggots into the skin.



Photo 1: Fly maggots in the skin lesions (Photo J. Starič)

The clinical picture and the identification of the maggots in the lab confirmed the diagnosis of cutaneous myiasis and the green bottle fly, *Phaenicia sericata* Meig. as the causative agent.

The lambs showed no signs of an invasion of fly larvae although a physical examination revealed that two of them had pyoderma on the ventral part of the tail and around the anus.

We took blood samples from the two sheep for CBC, the differential white blood count and measurement of the activity of the creatinine kinase enzyme in the blood serum.

Table 1: The haematological values and activity of creatinine kinase in the two sheep with cutaneous myiasis

	sheep with twins (sheep A)	sheep with one lamb (sheep B)	reference values
Erythrocytes	7.70	10.18	7.8 - 13 x 10 <sup>6</sup> /mm <sup>3</sup>
MCV	40	39	28 - 44 fl
MCHC	30.0	30.0	31 - 34 g/dl
MCH	12,0	11,8	8 - 12 pg
Hb	9.2	12.0	9 - 14.7 g/dl
Ht	30.7	40.1	0.27 - 0.45 l/l
Thrombocytes	294	105	250 - 750 x 10 <sup>3</sup> /mm <sup>3</sup>
Leucocytes	5.9	4.8	5 - 12 x 10 <sup>9</sup> /l
Lymphocytes	49	67	50 - 73 %
Seg. gran.	50	30	17 - 45 %
Bands	0	0	0 - 3 %
Eosinophils	1	3	1 - 10 %
Monocytes	0	0	0 - 6 %
Basophils	0	0	0 - 2 %
CK	151	163	to 120 U/l

Sheep B had a slightly increased haematocrit level (40.1 l/l), slight leucopenia ( $4.8 \times 10^9/l$ ) and thrombopenia ( $105 \times 10^3/mm^3$ ). Sheep A had a slightly reduced number of erythrocytes ( $7.7 \times 10^6/mm^3$ ), a decreased haemoglobin level (9.2 g/l) and a higher than normal number of segmented granulocytes 50 %. The other CBC and differential white blood count values were normal. The activity of the creatinine kinase enzyme was elevated in both sheep, 163 U/l in sheep B and 151 U/l in sheep A.

### *Therapy*

The affected area was first shorn and then washed with disinfectants until it was free of all dirt, necrotic tissue and visible fly maggots. The entire affected area was



Photo 2: The sheep with twins a day after the first therapy (Photo J. Starič)



Photo 3: The sheep with one lamb on the 4<sup>th</sup> day of therapy (Photo J. Starič)

washed with a solution (30 g dissolved in 5 L of tap water) of the antiparasitic agent trichlorfon (Neguvon®, Bayer). Each sheep was also given 1.5 ml of Dectomax® (Pfizer) subcutaneously. Its active ingredient doramectin is from a class of drugs called avermectins, which have a broad spectrum of antiparasitic activity. It was used to kill fly maggots that may have survived by burrowing into the skin. Because of the severity of the skin lesions we also administered penicillin and streptomycin to both sheep in the form of Pentard strep® (Krka) at a dosage of 6 ml i.m. SID, for 5 days.

One day after the therapy the body temperature of the sheep had returned to normal and there were no maggots found during an inspection of the affected skin and fleece.

The necrotized skin dried and healed quickly and within two days the necrotic skin had begun to peel, revealing the viable skin under it. The purulent vaginal discharge completely ceased after 3 days.

### Discussion

The clinical picture we described is typical of skin myiasis. Prof. Brglez (10) reported a similar case in the Kočevska region of Slovenia where 9 sheep of a bigger flock were affected in the autumn following their first lambing. Cutaneous myiasis most commonly affects the hindquarters (1, 11, 12) as the food supply from the animal's urine, faeces and lochia and the moist conditions there are ideal for the development of the eggs and maggots (3, 9). All the factors that predispose sheep to cutaneous myiasis were there in our case: the sheep had just lambed, they were unshorn and unprotected by insecticides, and the weather was warm and humid (October 2001 was very warm and humid). Bacteria often colonize skin lesions caused by cutaneous myiasis. This and subsequent waves of fly-larvae infestations in favourable conditions constantly extend the skin lesion. Fly maggots also excrete ammonia that is absorbed by the skin, which additionally poisons the organism. Heavily infested animals also show signs of general disturbance, debilitation and a loss of condition (13). Skin lesions are painful and disturbing and cause sheep to change their usual behaviour. This was also obvious in our case.

In the cases we have described the CBC values that deviated from the normal reference values indicated inflammation and debilitation. The raised activity of the creatinine kinase enzyme could be a consequence of either tissue damage caused by the cutaneous myiasis or because of the physical effort associated with moving the sheep from pasture to home.

Other authors have also described the same clinical picture of sheep suffering from cutaneous myiasis (1, 5, 13).

Therapy should be adjusted for each affected animal. In mildly infested animals without visible skin lesions, just shearing the wool from the affected area can be enough in favourable conditions. In areas where cutaneous myiasis is more widespread, they routinely shear wool from the hindquarters. This procedure is called tagging or crutching (1) and prevents the eggs or maggots developing as they exsiccate and it protects sheep from being flystruck in the hindquarters for about 6 to 8 weeks (1, 5). Shearing the whole sheep prevents strikes on other parts of a body,

while shearing the head or around prepuce prevents strikes on the head or pizzle. We are of the opinion that this would cure most of the mild cases and by correctly timing the shearing of sheep, it would also be a good way to prevent flystrikes of predisposed sheep in Slovenia.

For more heavily affected sheep we recommend, in addition to the shearing, a topical treatment of the affected area with both larvicides and insecticides. Deep cutaneous wounds in sheep with cutaneous myiasis should be thoroughly cleansed with disinfecting agents and the sheep treated with broad spectrum antibiotics or, in more refractory infections, with antibiotics following culturing and sensitivity testing. Supportive therapies like infusions, analgesics and anti-inflammatory medicines could also be given to more heavily affected animals to help stimulate recovery (1, 5). Both sheep responded very well to our therapy and completely recovered.

Preventive measures against cutaneous myiasis must be carried out although they should be varied depending on the number of sheep in a flock, the amount of time the shepherd spends with them, their physiological state, the fly population and the forecasted weather conditions. Measures such as shearing the sheep, tail docking, mulesing and hygienic lambings etc. can reduce a sheep's susceptibility to flystrike or reducing the fly population with the use of insecticides and larvicides or with genetically altered and sterile male flies can also prevent flystrikes (1, 11, 12, 14, 15, 16, 17, 18).

We are of the opinion that cutaneous myiasis should get more attention because of the increasing number of sheep in Slovenia and the losses that it can cause. A strategy for preventing and combating this disease should be established and shepherds should be more informed on how to recognize and prevent the disease.

### Acknowledgements

We would like to thank Prof. Dr. Brglez from the Veterinary Faculty in Ljubljana and Dr. Sivec from the Natural History Museum of Slovenia for their help identifying the fly maggots.

### References

1. Radostis OM, Gay CC, Blood DC, Hinchcliff KW eds. *Veterinary medicine: a textbook of the diseases of cattle, sheep, pigs, goats and horses*. Philadelphia: W.B.Saunders, 2000: 1393-8.
2. Fenton A, Wall R, French NP. The effects of oviposition aggregation on the incidence of sheep blowfly strike. *Vet Parasitol* 1999; 83: 137-50.
3. Martin WB, Aitken ID eds. *Diseases of sheep*. 3<sup>rd</sup> ed. Oxford: Blackwell Science, 2000: 292-4.
4. Wall R, Smith KE. Colour discrimination by the sheep blowfly *Lucilia sericata*. *Med Vet Entomol* 1996;10 (3): 235-40.
5. Aiello SE ed. *The Merck veterinary manual*. 8<sup>th</sup> ed. Whitehouse station: Merck & Co., inc, 1998: 650-2.
6. Hall MJ. Traumatic myiasis of sheep in Europe: a review. *Parassitologia* 1997; 39 (4): 409-13.
7. O.I.E. Manual. Paris: O.I.E., 2000: 313-21.
8. Bowen FL, Fisara P, Junquera P, Keevers DT, Mahoney RH, Schmid HR. Long-lasting prevention against blowfly strike using the insect growth regulator dicyclanil. *Aust Vet J* 1999; 77 (7): 454-60.

9. French NP, Parkin TDH, Morgan KL. A case control study of blowfly strike in lambs. *Vet Rec* 1996; 19: 384-8.
10. Brglez J. *Lucilia sericata* - povzročitelj kožne miaze pri ovcah. *Sod Kmet* 1985; 5: 216-7.
11. Fenton A, Wall R, French NP. The effect of farm management strategies on the incidence of sheep strike in Britain: a simulation analysis. *Vet Parasitol* 1998; 79: 341-57.
12. James PJ, Mitchell HK, Cockrum KS, Ancell PMC. Controlled release insecticide devices for protection of sheep against head strike caused by *Lucilia cuprina*. *Vet Parasitol* 1994; 52: 113-28.
13. O'Brien DJ, Morgan JP, Lane MF, O'Reilly PF, O'Neill SJ. A novel dip formulation of a synthetic perythroid (SP) for the control of blowfly myiasis of sheep. *Vet Parasitol* 1997; 69: 145-50.
14. Watts JE, Marchant RS. The effects of diarrhoea, tail length and sex on the incidence of breech strike in modified mulsed Merino sheep. *Aust Vet J* 1977; 53 (3): 118-23.
15. Lonsdale B, Schmid HR, Junquera P. Prevention of blowfly strike on lambs with the insect growth regulator dicyclanil. *Vet Rec* 2000, 147: 540-4.
16. French NP, Wall R, Morgan KL. Ectoparasite control on sheep farms in England and Wales: the method, type and timing of insecticidal treatment. *Vet Rec* 1994; 135: 35-8.
17. Thompson DR, Rugg D, Scott PG, Cramer LG, Barrick RA. Rainfall and breed effects on the efficacy of ivermectin jetting fluid for the prevention of fly strike and treatment of infestations of lice in long-wooled sheep. *Aust Vet J* 1994; 76(6): 161-4.
18. Ward MP. Use of interpolated climatic parameters to predict risk of blowfly-strike in Queensland sheep flocks. *Vet Parasitol* 2001; 49: 115-24.