

Sheep scab – a disease overview

Dr Renée Lodder BVSc BCom MCRVS, technical veterinarian, Europe Bimeda Animal Health Ltd, gives a comprehensive overview of sheep scab, its diagnosis and treatment options

- Sheep scab is an allergic dermatitis, which can have clinical signs like pruritis and wool loss or be subclinical in the early stages.
- A serum ELISA test is now available for clinical and subclinical diagnosis of the disease. The test can also be used to monitor how effective treatment has been.
- The recent study where sheep scab has been found to be resistant to moxidectin, a 3ML injectable product, has meant that treatment methods need to be reviewed for each farm.
- Plunge-dipping options are available in Ireland and there has been a rise in the number of farms using mobile plunge dipping services.

Sheep scab is a major concern for sheep farmers as it has a significant impact on the health, welfare and productivity of affected animals. Clinical signs of infestation are, generally, seen throughout the winter months but can be seen anywhere from September to April.

WHAT IS SHEEP SCAB?

Sheep scab is a disease caused by the mite *Psoroptes ovis* which lives on the skin surface where it feeds. The faeces

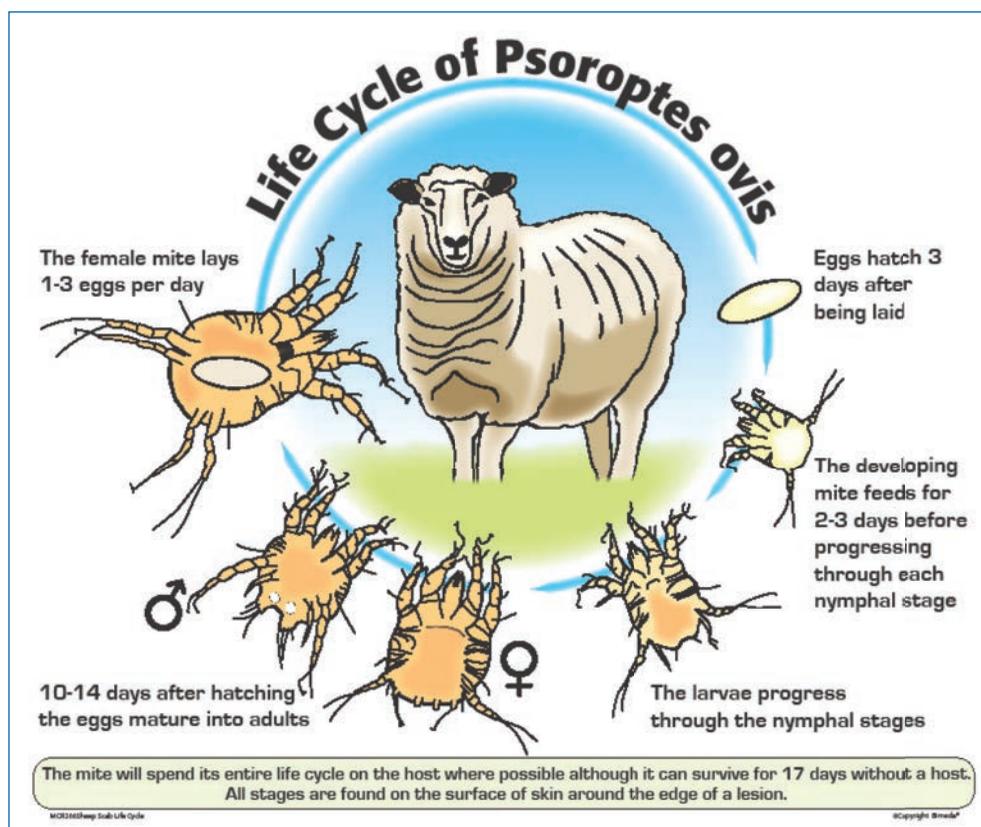
produced by the sheep scab mite cause a severe allergic dermatitis resulting in the 'scabby' lesions, which we associate with the later stages of the disease.

The mites are transferred from animal to animal by direct contact or on 'fomites', which are pieces of wool containing sheep scab mites. These mites are able to survive for 17 days without a host to feed from making it challenging to control with high potential for re-infection.

Infestations can be debilitating, have a detrimental impact on welfare and can lead to severe economic losses. It is difficult to find data on the cost to the sheep industry in Ireland but in the UK, the Sheep Health and Welfare Group report 2016 states that the annual estimated cost of sheep scab in the UK is £8.3 million!²

Skin lesions typically seen are severe dermatitis with thickened erythematous skin, alopecia, dry scales and crusts. Clinical signs of the disease in sheep include:

- Restlessness;
- Rubbing against fence posts;
- Soiled/stained areas of wool;
- Head tossing/biting;
- Pulled wool appearance leading to eventual wool loss;
- Loss of condition; and
- Death.



DIAGNOSIS

First and foremost, confirm which parasite is present. The clinical signs of lice and sheep scab infestation can be identical, particularly in the early stages. The other complicating factor is that both diseases are contracted in the same way; through poor biosecurity. Therefore, this means there is nothing to prevent animals from being dual infected with sheep scab and lice. The diagnosis of lice could also mean that there is a sheep scab infestation as well, and vice versa.

Every infected sheep will undergo a subclinical phase. This means that it is infected with sheep scab mites, which can be transmitted to other animals, but there are no visible clinical signs such as

scratching/wool loss. This subclinical phase can last for up to eight months.¹

Diagnosis of sheep scab was traditionally based on clinical observations and the identification of mites in skin scrapings. Skin scrapings are taken by using a scalpel blade at the edge of the active lesions, the scraping being continued until enough material is available, which is then transferred onto a microscope slide with a drop of lubricant oil and observed under low magnification (x100). This approach is often unable to detect subclinical disease or subclinical carriers as the lesions are not easily identifiable and mite numbers might be low. This sometimes meant that by the time the mites are detected, they have often already spread to the rest of the flock.¹

SERUM ELISA

The recent development of a serum ELISA test by the Moredun Research Institute for the detection of antibodies specific to a mite allergen has proven a highly sensitive diagnostic tool for sheep scab. This test has a high sensitivity and specificity for the *Psoroptes ovis* mite. It is best to be used at flock level using 12 sheep for up to a 2,000-animal group. The blood test can be very valuable to exclude other common diseases causing similar clinical signs (eg. pruritus and wool loss). Differential diagnoses of the clinical signs are other ectoparasites (mainly lice and other manges), photosensitisation or other dermatitis like fleece-rot or dermatophilosis. Although skin scraping is still considered the routine technique for clinically evident sheep scab, it is relatively time consuming and requires a skilled operator for microscopic identification of ectoparasites. The ELISA test can reliably diagnose sheep scab as early as two weeks post-infestation. The test, therefore, represents a significant improvement in the diagnosis of the subclinical disease, which might not have been possible due to the lack of clinical signs and high percentage of false negative skin scraping results. This serum ELISA test can also be applied as a screening tool when animals are quarantined after being bought in, returning from away wintering or rented to other farms for mating. The ELISA test can also be used to review the efficacy of the treatment used previously for sheep mites.

TREATMENT

In Ireland, there are two main treatment options for controlling sheep scab (Table 1). A key consideration for parasite control strategies is ensuring that we use the correct active ingredient at the correct time. The treatment should be tailored to the individual farm and specific situation. The options are to plunge dip the sheep or to use an injectable Group 3 macrocyclic lactone (3ML) endo-parasiticide wormer. For plunge dipping there are two options: an organophosphate diazinon dip or a cypermethrin dip. For injectable 3ML products there are ivermectin, doramectin or moxidectin injections available in Ireland. The injectable 3ML products are essentially an internal worm treatment which also treats some external parasites. The plunge dip options for sheep scab treatment and prevention are also effective on other ectoparasites like lice, keds, ticks and flies.

Table 1. Active ingredients licenced for the control of sheep scab.

| Group | Active Ingredient | Preparation |
|----------------------|-------------------|-------------|
| Plunge dip | Cypermethrin | Plunge dip |
| | Diazinon | Plunge dip |
| Macrocyclic lactones | Ivermectin | Injectable |
| | Doramectin | Injectable |
| | Moxidectin | Injectable |

There is a possibility that, when using an injectable 3ML product for sheep scab, we are using the product at a time when an internal worm treatment is not required. In winter, the gastrointestinal roundworms are generally present in low numbers and are less likely to cause disease requiring treatment than during the grazing season. Overuse of an anthelmintic, like under-dosing due to poor injection technique, is a risk factor for resistance occurring. As an industry, we need to protect the long-term use of different families of worming products so that resistance does not occur and that we have all our products working effectively in the long term. However, the injection option can be less stressful for the sheep, can be easier for operator safety but can take up to seven days to kill the mites.¹

Plunge-dipping, generally, kills mites within 24 hours and provides residual activity for several weeks, ie. past the period of 17 days, which is how long the mite can survive off the animal. Plunge dipping has efficacy against a range of ectoparasites, including sheep scab. Correct dipping technique is important to ensure that the treatment is effective. The key points for effective sheep dipping include the immersion of the whole body of the sheep in the dip for at least 60 seconds; the use of the correct concentration of dip; and correct tank replenishment. Operator safety is also crucial, especially when using organophosphates, so wearing the correct personal protective equipment (PPE) is important. It is also important to have a plan for the disposal of the dip wash once finished. There has been a rise in the number of farmers using mobile plunge-dipping services, which are a very convenient and cost-effective option. The mobile plunge-dipping service operators are able to manage a lot of the requirements of the dipping process and the product recommendations.

The use of showering dipping or jetting is not recommended for treating sheep scab. There are no licenced products for sheep scab treatment using a shower dip or jetting machine in Ireland. It is often difficult for the product to cover the whole sheep with shower dipping. This can mean that the whole animal is not treated effectively and can contribute to the spread of this contagious disease. Every product, whether they be plunge dips or injections, will have different recommendations and restrictions for use, as well as withdrawal periods, so it is important to check the SPC with every product used.

RESISTANCE

A recently published paper showed the first evidence of resistance of the sheep scab mite to a 3ML endectocide (injectable moxidectin).³ In this study, four farms in the UK,

which had had reports of historical treatment efficacy concerns were used. Mites were collected and were exposed to different concentrations of the compound and, even when exposed to very high concentrations, they were able to survive on all four farms.³ Currently, work is being done to assess whether there is cross-resistance to other actives in the 3ML injectable group. A farmer may wish to assess whether the sheep scab treatment has been effective or not, especially if they are still seeing clinical signs after treatment. Investigations using the diagnostic tools of skin scrapping and the ELISA serum testing can be useful in these cases. A thorough history is important and may require two serum ELISA tests two to three weeks apart to look for a rising or declining antibody level at flock level. It is important to report any cases or investigations to the manufacturer of the product and/or the Health Products Regulatory Authority. While resistance has been confirmed in a small number of flocks it is important to remember that there are many other reasons why treatment may either be unsuccessful or appear to be unsuccessful. It is possible to eradicate resistant mites from a flock with a clear management plan, should resistance be identified.

INDUSTRY ACTIVITIES

Sheep scab is a notifiable condition in Ireland in sheep, which means outbreaks in flocks should be notified to the Department of Agriculture, Food and the Marine. Currently, the sheep industry is working together in Northern Ireland to develop a sheep scab eradication scheme. There are also a number of groups working together in the UK to manage and eliminate the disease in their regions.⁴

PREVENTION

One key aspect of disease control for sheep scab is biosecurity, irrespective of the treatment chosen previously. Handling pens, equipment and fields should also be considered contaminated for at least 17 days after the removal of infested sheep. It is also important to change clothing when moving between flocks who may be affected with sheep scab. Best practice for the prevention of infestation on a farm is to quarantine and sometimes treat, all incoming animals three weeks before mixing with other sheep on the farm. The maintenance of good fencing, disinfection of vehicles and equipment and careful observation of sheep regularly are also recommended. The sheep scab ELISA serum test is a good tool for monitoring animals coming onto a property as it detects infestation of clinical and subclinical disease.

REFERENCES:

1. Busin, 2018. What's new (and not so new) about sheep scab. *Livestock*, 23(4), pp. 195-198.
2. Sheep Health & Welfare Report for Great Britain <http://beefandlamb.ahdb.org.uk/wp-content/uploads/2016/10/SHAWG-report-2016-17-181016.pdf>
3. Doherty, et al. 2018. First evidence of resistance to macrocyclic lactone in *Psoroptes ovis* sheep scab mites in the UK. *Veterinary Record* doi:10.1136/vr.104657
4. <https://www.agriland.co.uk/farming-news/sheep-scab-meeting-to-explore-interest-in-ni-eradication-scheme/>

READER QUESTIONS AND ANSWERS

1. HOW LONG CAN THE PSOROPTES OVIS MITE SURVIVE WITHOUT AN OVINE HOST?

- A. 21 days
- B. 28 days
- C. 17 days
- D. 36 hours

2. WHEN SHEEP ARE INFECTED WITH SHEEP SCAB, WHAT CLINICAL SIGNS ARE OBSERVED?

- A. Pulled wool leading to eventual wool loss
- B. Pruritis
- C. Thickened erythematous skin plus alopecia, dry scales and crusts
- D. No clinical signs, in the early subclinical phase
- E. All of the above

3. THE RECENT DEVELOPMENT OF A SERUM ELISA TEST CAN DIAGNOSE SHEEP SCAB AFTER HOW MANY WEEKS POST INFECTION IN SHEEP?

- A. 2 weeks
- B. 3 weeks
- C. 4 weeks
- D. 5 weeks

4. WHEN PLUNGE DIPPING SHEEP BEST PRACTICE ADVICE SHOULD BE FOLLOWED BY FARMERS AND MOBILE PLUNGE DIPPING CONTRACTORS. ONE AREA IS THE LENGTH OF TIME THE WHOLE BODY OF THE SHEEP SHOULD BE IN THE DIP. THE RECOMMENDED TIME IS:

- A. 30 seconds
- B. 60 seconds
- C. 2 minutes
- D. 5 minutes

NB: always read the label/SPC for any product used for best practice guidelines and withdrawal periods.

ANSWERS: 1 C; 2 E; 3 A; 4 B