

## LATEST IN SHEEP SCAB CONTROL

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**Valentina Busin** reviews development in treatments for the allergic dermatitis caused by *Psoroptes ovis*, endemic among sheep flocks in the UK

### **WHAT is new about sheep scab? Unfortunately, not very much.**

This unpleasant disease is still endemic in the UK, it has an extremely serious impact on animal welfare and production and control strategies still heavily rely on chemotherapy.

On the other hand, ELISA tests for sub-clinical detection of the disease are on the horizon and researchers are actively involved in the development of a sheep scab vaccine, with promising future for the control of sheep scab.

### **The disease**

Sheep scab is an allergic dermatitis caused by the non-burrowing mite *Psoroptes ovis*. The faecal deposition of *P ovis* on the skin of the animal causes an intense inflammatory reaction, with marked pruritus, resulting in self-trauma, extensive pyodermatitis, severe alopecia and considerable loss of weight (Kirkwood, 1986). The lesions are distributed primarily along the trunk, but, if left untreated, can quickly spread over the entire body ([Figure 1](#)).

The disease is transmitted by direct contact and it is host specific, with the parasite spending its entire life cycle on the sheep.

## Diagnosis

Sheep scab is a highly contagious disease so an accurate diagnosis, by demonstration of live mites ([Figure 2](#)), is essential as inappropriate treatments will prove expensive and ineffective.

The traditional diagnosis of *P ovis* infestation is based on clinical observations and microscopical detection of mites in skin scrapings.

Skin scrapings can be taken by using a scalpel drawn at right angles over the skin surface at the periphery of active lesions and the scrapings observed microscopically under  $\times 50$  magnification.

However, examination of skin scrapings only detects sheep scab in animals with visible skin lesions, so is unreliable to diagnose early infections. As a consequence, when *P ovis* is detected, the mites have often already spread out into the flock.

## Treatment

As the scab mites can survive in the environment for up to 17 days, it is essential all animals within the holding are treated. This can be a particular problem in common grazing, when securing cooperation from all users could be difficult. Also, timing for treatment may be problematic, especially in cases of heavily pregnant ewes or animals with young lambs.

The available options for whole flock treatment are organophosphate dips and injectable avermectins.

In the first case, the only plunge dip available in the UK is diazinon, which has environmental and health implications and a very prolonged meat withdrawal period (70 days). Moreover, dip solutions need to be correctly diluted and replenished, since organic material can bind the dip chemical, reducing its effective concentration, and sheep need to be immersed for one minute, with their heads submerged twice.

The advantages are the extended residual protection, with persistence up to several weeks and the direct effect on mites, by killing them within 24 hours.

In the case of injectable avermectins there are different options in relation to residual protection against reinfestation.

Ivermectin at the dose rate of  $200\mu\text{g}/\text{kg}$  affords only seven days of protection; therefore, unless uninfected premises are available, a second injection seven days apart is needed to control the disease. Doramectin (at  $300\mu\text{g}/\text{kg}$ ) shows persistence of activity for marginally less than 17 days, so a single intramuscular injection is, therefore, sufficient.

Finally, two injections of moxidectin (at 200µg/kg dose rate) 10 days apart are recommended for treatment of sheep scab. The recently launched long-acting moxidectin two per cent, with 60 days persistence after a single injection, affords an extended period of protection, with a better chance of coordinated treatments between neighbouring farms.

## Controlling sheep scab

Until 1992 statutory control of sheep scab in the UK was based on compulsory plunge dipping at specific times of the year.

After deregulation of compulsory dipping, the national prevalence of sheep scab has shown a progressive increase, reaching levels between 10 per cent and 15 per cent in the past few years. One of the main reasons is the approach to treatment, which is now mainly carried out by farmers on a case-by-case basis. Effective control of sheep scab, though, can only be achieved by a strategic and coordinated approach.

On this matter, the Scottish Government has put in place the Sheep Scab (Scotland) Order 2010, which reinstated scab as notifiable disease, restricting any movement off or on to the premises of a possibly infected holding.

The order also enables enforcement action to be taken against those owners and keepers whose sheep are suspected of having scab, but who fail to take the necessary action to treat, undermining the efforts of the majority to prevent the spread of the disease. Even if there are different opinions wherever this approach should be taken at a national level, it shows clear interest from the wider industry to tackle the disease more effectively.

## What's new?

Since demonstration of specific antibodies against *P ovis* in infected animals, several assays have been developed for antibody detection in sheep.

Recently, the Moredun Research Institute has developed an ELISA test for the detection of antibodies specific to the sheep scab antigen, which will aid in the diagnosis of sub-clinical infestation (Nunn et al, 2011). The test is not yet commercially available, but the SAC is providing veterinary surgeons in Scotland with free ectoparasitic examinations of sheep skin scrapings combined with clotted blood samples. All sheep from which skin scrapings were collected should be bled, together with others that appear unaffected (up to 10 blood samples). Further research is also looking at a pen-side dipstick test for scab, which would provide a much more rapid test.

Ongoing research is also trying to elucidate the mechanisms of natural immunity to the sheep scab mite, with a view to developing effective vaccines (Smith et al, 2001). Previously infected sheep seem to acquire strong immunity to *P ovis*, but studies on potential recombinant vaccine

candidates are still in progress.

Biological sheep scab control methods under consideration include the use of the entomopathogenic fungi (*Metarhizium anisopliae* and *Beauveria bassiana*), where in-vitro studies have shown positive results (Abolins et al, 2007) and the use of the bacteria *Bacillus thuringiensis*, which produce protein crystals that are toxic to ectoparasites (Pinnock, 1994).

Finally, as different breeds of sheep are known to exhibit different degrees of susceptibility to infection, breeding for genetic resistance to sheep scab is another potential, longterm solution.

## References

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