

Control of Sheep Scab and other Ectoparasites of Sheep

SUMMARY

- **In Scotland sheep scab became notifiable to the local Divisional Veterinary Manager of Animal Health under the Sheep Scab (Scotland) Order 2010.**
- **Sheep scab is one of the most contagious diseases of sheep in Britain. The disease seriously affects the welfare of sheep and has a significant economic impact through its effect on the condition of ewes, the growth rate of lambs, damage to wool and reduced quality of sheepskins.**
- **The other common ectoparasites of sheep (lice, ticks and flies) have serious economic significance.**
- **Measures to control and treat ectoparasites of sheep are expensive and should be planned to maximise their benefit. An accurate diagnosis is essential. This note aims to help producers plan the control of ectoparasites on their farm.**
- **Details of dipping procedures and other practical control measures are available in HSE Leaflet AS29.**

Sheep Scab

Sheep scab was mainly a disease of the autumn and winter but now outbreaks occur throughout the year. Scab may be introduced to a flock by animals returning from shows, market, or away wintering and from neighbour's sheep. Plunge dips and injectable products are the only treatments for control of scab. Pour-ons and application of dip by jetters or in spray races are NOT effective. Flockmasters should discuss the choice of products with their veterinary surgeon or licensed animal health distributors to ensure they are used effectively and economically. The practice of dipping is tightly controlled by legislation and many issues require to be addressed before dipping can commence. In early 2010 the manufacturers of synthetic pyrethroid dips voluntarily withdrew their manufacturing licenses and so the choice of dip is now restricted to **organophosphate containing dips only**.



Early sheep scab in sheep at a market

Life cycle and infectivity

Sheep scab is caused by the parasitic mite, *Psoroptes ovis*. The female mite lays one or two eggs daily in the fleece of the sheep for about 40 days. Under ideal conditions, larval mites hatch from eggs and go through various development stages to become adults after about two weeks. Mites can exist off the sheep and remain infective for up to 16 days. Thus fence posts used for rubbing, handling facilities, trees, bushes, transporters, shearing equipment and contaminated clothing can all be a source of infection and remain so for a considerable period. Transmission is usually directly from one sheep to another but sheep can pick up infection from any of these other sources.

The mites feed on the surface of the skin. The intense irritation they cause is believed to be a result of an allergic reaction of the sheep to the mite and its faeces. The severity of this reaction varies with the strain of mite, between individual sheep and also between breeds.



Sheep scab - severe loss of wool, bare skin and scabs

How to Recognise Sheep Scab in Your Flock

Examining Your Sheep

- Look for rubbing and wool loss. Bare areas of skin and loss of condition are also very typical of sheep scab.
- Part the fleece in several areas, suspect scab if you find scales and scabs
- Sometimes mites can be seen as moving white specks just visible to the naked eye around the edges of the scabby or red area (or under a scab if removed).

- Consult your veterinary surgeon immediately if you are at all unsure, symptoms can be confused with lice and scrapie.

Early Signs

- Rubbing against fences and posts
- Biting at flanks
- Scratching with hind legs or horns
- Discoloured fleece, due to rubbing and scratching especially dirt marks from hooves
- Tags of fleece pulled out on the flanks in very early stages

Advanced Disease

- Areas of wool loss and bare areas especially on shoulders and flanks
- Scabs in fleece
- Poor body condition
- Clumping or clotting of wool
- Damaged moist red skin
- Dry crusty scabs with moist red borders
- Mites visible at the edge of lesions, in the ear or in front of the eye

In both early and advanced stages not all of the animals in the flock will show symptoms but assume all are infected.

Legislation

Dips, sheep dipping and dip disposal are under legislative control to protect the environment, operators and consumers. Only holders of a Certificate of Competence (or the employer or someone acting on behalf of the holder) are legally able to purchase any sheep dip. SAC and the Scottish Skills Testing Service (SSTS) have provided advice, training and assessment for certification with one day courses at local venues throughout Scotland. If a course is required, contact your local SAC adviser. Farmers with existing certificates should update their skills by reading leaflets such as HSE AS29.

If you employ staff to dip sheep a COSHH assessment is required. The Health and Safety Executive (HSE) has prepared a publication jointly with the Veterinary Medicines Directorate and the Environmental Agencies, called Sheep Dipping (leaflet AS29) and a copy should be obtained to assist with the COSHH assessment.

Under Groundwater Directive 80/68/EEC all discharges of list 1 substances (including dips) to groundwater are prohibited. Farmers who dip sheep and dispose of the sheep dip require authorisation from the Scottish Environmental Protection Agency (SEPA) (Environmental Agency in England and Wales) to dispose of sheep dip onto their land. An application form for authorisation is obtained from your local agency office. Submit your application well before you plan to dispose of dip because the Agencies normally require several weeks to process an application, as various bodies must be consulted.

However, in Scotland, SEPA will “fast-track” applications from farmers with flocks that are either affected by, or at risk from, sheep scab. A letter from a veterinary surgeon must support “Fast-track” applications. The Agencies may visit the site prior to authorisation. There is an initial charge and thereafter, an annual charge to cover the cost of monitoring, inspection and enforcement. The spent dip may be tankered to another site for disposal as an alternative to incurring Agency charges. Separate authorisation is required for each site. (See SAC Technical Note T475; Waste Sheep Dip Treatment and Disposal).

The Sheep Scab (Scotland) Order 2010 includes provision for

- Compulsory notification of sheep scab to the Divisional Veterinary Manager (DVM)
- Restrictions on movement
- Compulsory treatment of all sheep on a premises where sheep scab exists or
- Movement to slaughter

AND

- Requirement for written declaration of treatment from farmer
- Or a report from the vet to the DVM if sheep scab is not present.
- The Order also enables Local Authorities to tackle sheep scab on common or open grazing where owners are unable to deal with the problem by consensus.
- The Order provides powers for local authorities to serve notices, where farmers are failing to take action, imposing movement restrictions and requiring them to arrange and pay for a veterinary enquiry to establish if scab is present. If it is present those sheep must then be treated or slaughtered.

Farmers are advised to contact their Local Authority or Animal Health Office for full details of their obligations under the new Order.

Failure to comply with any part of this Order is an offence. The person involved is in default and must reimburse any reasonable expenses incurred by the Scottish Ministers or the local authority in taking such steps.

This Order does not apply in the local government area of the Shetland Islands.

The Sheep Scab order 1997(a) in so far as it applies to Scotland is revoked although certain provisions as detailed in The Sheep Scab (Scotland) Order 2010 continue to have effect.

Treatment and control programmes

Flockmasters should plan their treatment and control strategy because of the high economic and welfare cost of sheep scab. They should seek advice from their veterinary surgeons and discuss plans with their neighbours to maximise the benefits of their actions.

Treatment and control of sheep scab can be carried out by either plunge dipping or the use of injectables licensed for sheep scab. No pour-on, spray or jetting product is effective in the treatment and control of scab. Injectables can be used to treat and/or control an existing scab infestation, or to prevent a scab infestation. Short action products kill mites but offer no protection against re-infection. The four types of injectable products are:

- a) Ivermectin; - two injections (7 days apart) for treatment
- b) Doramectin - one injection treatment and control
- c) Moxidectin 1% - two injections (10 days apart) for treatment, one injection prevents re-infection for up to 28 days
- d) Moxidectin 2% LA – one injection for treatment and prevents reinfection for up to 60 days

Both c and d have residual action and comply with Sheep Scab (Scotland) Order 2010 for use on common grazings, where treatment with an approved product which provides protection against re-infection by sheep scab mites, may be required under certain conditions.

All these injectable products kill parasitic worms but not liver fluke. Their use should be integrated with your flock's worm control programme. The dips and injectables are listed in table 1 together with their withdrawal periods for meat.

Your sheep scab control programme should address the following points.

Routine flock scab control

- Assume all sheep arriving on your farm could be infected with sheep scab.

This will include all:

- bought-in sheep including rams.
- sheep returned from market, summer grazing or shows.
- sheep arriving for wintering.
- sheep returning from away wintering.
- stragglers.
- Check fences and gates before sheep are unloaded.
- Dip or treat with one of the injectables.
- Do not mix with the main flock until full treatment has been completed in accordance with the manufacturer's directions (See table 1).
- Assess the risk of sheep scab affecting your flock with your veterinary surgeon.
- If appropriate treat all sheep on your farm in the spring with a product approved for scab i.e. dip or injectables. This is best done when all the sheep can be readily gathered.
- Treat away wintered lambs before departure and monitor them closely during the away wintering period.
- Maintain effective fences.

Remember it is not just sheep moved onto the farm which can be carrying sheep scab mites. Any container used to transport sheep e.g. trailers, wagons, and any equipment used by contractors and shearers presents a risk for the spread of scab unless they are fully cleaned and disinfected prior to use.

In the event of an outbreak

- Notify the local DVM of Animal Health
- Confirm the diagnosis through your vet and local SAC Consulting; Disease Surveillance Centre.
- Warn neighbours and arrange with your neighbours to dip or inject all your flocks at risk from scab as well as those affected with scab within a period of two to three weeks.
- This includes all sheep that could possibly have been in contact with the affected sheep or their fields.
- Alert the suspected infection source.
- Strictly adhere to the manufacturers instructions of the product being used for treatment. See table 1 for list of approved products.
- If using short action injections, move sheep to clean area after first treatment. Prevent contact with other untreated, uninfected sheep for at least 7 – 14 days, depending upon the product used.
- Consider the withdrawal period of the product chosen when treating finishing lambs.
- Severely affected animals are often in poor condition. If such animals are removed from the flock and grazed in-byes they will recover better and be less likely to re-infest the flock if treatment has not been 100% effective.

Dipping techniques

A planned approach to the dipping of sheep is essential. The proper use of dips provides an effective method for the treatment and prevention of sheep scab. Three steps to safe and effective dipping are described in table 2.

Injection techniques

The injectable products have the advantage that no specialist equipment is needed and most shepherds and farmers are familiar with both the subcutaneous and intramuscular routes of injection. These products are particularly useful for heavily pregnant ewes and are also very convenient for the treatment of small groups of sheep to be added to a flock. However, injection technique and sheep handling practices must be top class as a single missed sheep can re-infest the flock. A helper to restrain and mark sheep as they are injected works best. If you suspect a sheep has been missed, the manufacturers recommend that you treat it again. Miss one sheep and re-infestation is a real possibility. Sheep, which are injected, rather than dipped may continue to rub and scratch for several days (possibly as many as seven to ten) after treatment until all the mites are killed and the debris is lost. The long withdrawal periods for all the compounds now available makes them generally problematic. Their use in this class of stock will need careful planning for use in finishing lambs. Flockowners must ensure that sheep receive the full dose as recommended by the manufacturer. Under-dosing can result in reduced efficiency and incomplete control of sheep scab. Also under-dosing may encourage the emergence of resistant strains of mite. It is not safe to rely on published estimates of ewe liveweight based on breed as actual ewe weight varies with farm location and stage of pregnancy. Sheep should be weighed and dosed according to the weight of the heaviest in the group. The needle should be changed regularly (every 10 sheep) to minimise the spread of diseases such as maedi-visna and border disease.

Resistance

Resilience (incomplete resistance) to OP dips has recently been suspected. It can only be a matter of time before resistance occurs, now that only dips containing OP are available. If animals continue to exhibit symptoms of scab after dipping i.e. they continue to rub then flock owners should immediately contact their veterinary surgeon who will investigate the problem. This may be done with the assistance of the manufacturer of the product suspected of failing. Confirmation of a planned approach to the dipping of sheep, assessment of the dipping technique and confirmation of the diagnosis is critical. Samples of fleece may be taken to ensure that the product was used correctly. The sheep should be treated with another product containing a different chemical group i.e. an injectable product.

Other Ectoparasites of Sheep

Lice

Outbreaks of lice, like scab, are on the increase. The only species of any significance is the biting louse, *Bovicola ovis*, which lives in wool. It causes considerable wool loss and irritation which makes the sheep very restless and difficult to house. Symptoms of louse infestation can be confused with scab.

- Sheep rub and there is considerable wool loss. In particular, sheep bite at the wool on the flanks and are often seen with wool in their mouths.
- There is no marked loss of condition. Where wool has been lost there is fresh growth and areas of bare skin are uncommon.



Pulling of wool due to lice

- Scabs are not seen on the skin surface. If a sample of wool is removed and placed against a dark surface, lice can be seen clinging to it. They are readily seen, of an elongated shape, with a definite head and of a brown or white colour.

Lice can be eliminated by dipping in organophosphate dips. Pour-on preparations give good control of lice but do NOT totally eliminate them, especially from the larger breeds carrying a heavy fleece. Lice outbreaks are usually noticed in the winter; however pour-ons are most effective if applied as a preventative measure just after shearing. Lambs should also be treated since observations by SAC have shown heavy infestations to occur on lambs within a few weeks of birth.



Biting lice (1-2mm long)

Endectocide injections have little effect on lice. There is also concern that lice in the U.K. may develop resistance to pyrethroid pour-ons as has occurred in other countries.

Keds

The sheep ked, *Melophagus ovinus*, is a wingless fly. It is found in the wool and causes considerable irritation and, in particular, it damages the skin and is the cause of 'cockle' in sheep leather. Keds are of a dark brown colour and considerably larger than lice. They can be distinguished from ticks as they have six legs instead of eight for the tick.



Sheep keds (5-7mm long) in the wool

Dipping has largely eliminated keds in the U.K. and an infestation is very rare at the moment. Deltamethrin pour-on is licensed to control keds. Both lice and keds live permanently on the host and transmission is from infested sheep to clean sheep, especially when they are grouped together in the winter for feeding and / or housing. Particular care should be taken to isolate, inspect and treat, if necessary, any animals joining the flock, particularly replacements and especially tups (rams). Whilst both lice and keds can survive for substantial periods off the host, transmission from posts, handling facilities or trailers is unlikely.

Ticks

The sheep tick, *Ixodes ricinus* is associated with rough and unimproved pastures. During the life cycle of the tick, each stage must feed on an animal for a short time to obtain a blood meal. Farmers notice the adult female ticks, in particular, attached to the skin and engorging in those areas not covered by wool, i.e. the head, legs and axillae (the area between the upper leg and the body). Ticks are particularly numerous in the spring but can be seen at any time of the year. At this time their feeding causes abscesses in the joints, spine and internal organs of the lambs. This is known as 'tick pyaemia' or 'crippling' and badly affected lambs cannot keep up with their mothers and die of neglect. Ticks also transmit a viral disease of the nervous system called 'louping ill' and *Anaplasma phagocytophilum*, the causative agent of tick borne fever. Tick borne fever can cause abortion in pregnant ewes and temporary infertility in rams where animals are previous unexposed. On farms where this agent is a problem, management of replacements is undertaken to ensure exposure prior to the period of risk. On farms where louping ill disease is a problem, vaccination is advised.



The female (5-10mm) is larger than the male (2-3mm)

Traditionally ticks were controlled by dipping the ewes shortly before lambing and the lambs shortly after birth. It is, however, very laborious and stressful to dip heavily pregnant ewes and pyrethroid pour on preparations are widely used instead. Dipping may still be required on farms with a severe problem associated with high populations of deer which act as alternative hosts for this parasite. Both the dips listed in table 1 are effective against ticks. It is not desirable to totally eliminate ticks from a farm since a small residual population is required to maintain hill cattle's immunity to redwater fever. Pasture improvement and, in particular, regular controlled grass and heather burning will substantially reduce tick populations. Farmers and shepherds should be aware of the possibility of contracting Lyme disease from tick bites.

Sheep Blowfly

Green Bottles, *Lucilia spp.*, and blue bottles, *Calliphora spp.*, are attracted to wool damaged by excessive wetness, urine or faeces. They lay their eggs on the sheep and these develop into maggots. These eat their way into the sheep causing severe irritation and toxæmia. This is known as 'strike' and usually occurs in the breech area, although other areas can be affected. Struck sheep lag behind the rest of the flock,



Blowfly strike. Maggots feeding on skin surface. Note green coloured adult fly which lays the eggs on soiled areas of fleece.

are difficult to gather and seek refuge in bracken, rushes and other vegetation. Close up to an infected sheep there is a smell of rotting flesh. Animals are often seen trying to bite the affected area. On parting fleece or clipping away the wool, maggots can be seen together with a dark area of discolouration.

Strike is a serious welfare problem and failure to treat or prevent it has resulted in prosecution. The organophosphate dip on the market will treat and prevent strike. Stress and pollution can be reduced by the use of pour-on products. Pyrethroid pour-on products will treat blowfly strike and some will prevent it. Also extremely effective in preventing strike, but NOT treating it, are Cyromazine and Dicyclanil. These are pour-ons which contain an insect growth regulator that prevents the blowfly maggots developing.

CLiKZIN contains the same active ingredient as CLiK which is dicyclanil. The difference is in the concentration, CLiK contains 5% dicyclanil and CLiKZIN contains 1.25%. CLiKZIN has the advantage of a shorter meat withhold period of 7 days compared to the 28 days for CLiK. Both these products will prevent strike but not treat it.

Sheep Headfly

Sheep headfly, *Hydrotea irritans*, is associated with woodland. The fly, an olive green colour with yellow wing bases, is active in summer months. It is attracted to wounds and areas at the base of the horns. This causes the sheep to rub or scratch leading to raw, sometimes bleeding, lesions which can become infected with bacteria. Preventative treatment with synthetic pyrethroid pour-on applied between the horns or around wounds will prevent and reduce attack.

Conclusion

Although responsible flock owners may plan and institute a sheep scab control programme conscientiously and effectively, their flocks are still at risk from scab from those who are less responsible. Legislation is now available in Scotland to ensure that all sheep owners take action when scab is present in their flocks. Unfortunately damage may have already been done to neighbours' flocks.



Flies feeding on the damaged areas between horns.

Table 1: Scab treatment and control

Injections for prevention & treatment of scab.

Cyductin/Zermex (moxidectin) 2% LA – A single injection only is required for treatment and has 60 days persistence for prevention of re-infection.

Cyductin/Zermex (moxidectin) 1% - Two subcutaneous injections 10 days apart are required for treatment. A single subcutaneous injection provides protection against re-infection for 28 days. Treated, infected sheep should not be mixed with untreated, uninfected sheep for 12 days after the last treatment.

Group	Chemical	Trade Name	Marketed by	Meat withdrawal period
milbemycin 1%	moxidectin 1%	Cyductin 1%	Pfizer	70 days
		Zermex 1%	Pfizer	70 days
milbemycin 2%	moxidectin 2%	Cyductin 2%LA	Pfizer	104 days
		Zermex 2%LA	Pfizer	104 days

Injections for treatment & control of scab.

One intramuscular injection of Dectomax (doramectin) is required. Treated, infected sheep must not be mixed with untreated, uninfected sheep for 14 days.

Two subcutaneous injections of an ivermectin, seven days apart are required. Then only mix with untreated, uninfected sheep after a further seven days.

Group	Chemical	Trade Name	Marketed by	Meat withdrawal period
avermectin	doramectin	Dectomax Soln for Injection	Elanco	63 days
avermectin	ivermectin	Noromectin	Norbrook	42 days after 2nd injection
		Qualimec Soln for Injection	Janssen	42 days after 2nd injection
		Virbamec Injection	Virbac	42 days after 2nd injection
		Ivomec Classic Injection & Panomec	Merial	37 days after 2nd injection

Organophosphate dips - both with long lasting action

All kill mites and provide approximately four weeks protection from a single dipping.

Paracide 62* (Animax), Osmonds Goldfleece (Cross Vetpharm) **. Both these products contain diazinon and have a meat withdrawal period of 70 days.

(Allow 14+ days between dipping and dosing with any drench containing levamisole.)

Notes: * Paracide 62 is dispensed through a pump provided by the supplier. ** Osmonds Gold Fleece is dispensed using a special dispenser with a hand pump.

Table 2: Three Steps to Effective Dipping

Step 1 - Preparation

- To buy dip, you must have a Certificate of Competence (or employ a contractor who has one).
- Before you begin, ensure that the dip bath is clean, and that you know exactly how much it holds.
- Gather your sheep the day before dipping, and yard them overnight, if possible. (Keep them unfed for 12 hours, and you will reduce contamination of the dip and draining area with faeces).
- Before mixing the dip, read the instructions carefully and carry them out precisely. Fill the bath with clean water, add the concentrate using the means stipulated by the manufacturers and mix thoroughly, using metal tools.
- Ensure that Personal Protective Equipment (PPE) is available to, and worn by, everyone involved in the job. This will usually consist of:
 - Non-lined heavy-duty PVC or nitrile gauntlets at least 300mm in length and 0.5mm thick.
 - Wellington boots.
 - PVC or nitrile waterproof leggings or trousers.
 - PVC or nitrile waterproof coat or bib apron worn over the boiler suit etc.
 - In addition, a face shield **MUST BE** worn when handling the dip concentrate.
- Use a metal dipping pole.

Step 2 -The Days Work

All your sheep should be gathered and dipped. In practice however, particularly on hill farms with common grazing, this may difficult however all members in common grazings should be encouraged to gather and dip at the same time All bought-in sheep, including rams, must be treated.

- Start early
- Work steadily
- Rotate the tasks
- Take frequent breaks for refreshment. Everyone must wash and remove their protective clothing and wash hands before the break. It must all be put back on before starting again.
- Keep children and pets away from dipping area.
- Make sure there is a supply of soap and water available to wash off any splashes.
- No smoking during dipping.
- Keep the sheep immersed in the dip for one minute or as recommended by the manufacturer
- Keep each sheep in the drainage area as long as possible.
- Keep the drainage area swept clean to avoid contamination of the dip by faeces.
- Avoid handling wet sheep, and keep them away from streams etc.
- Top up/replenish the bath at the manufacturer’s recommended rate. Do not dip more sheep than the maximum number stated by the manufacturer without completely emptying and refilling the bath – even at the end of the day.

Step 3 - Disposal (See SAC Technical Note T475)

- Never allow the contents of the dip bath to enter a soakaway.
- Obtain authorisation from the Environment Agency (EA) or the Environment Protection Agency (SEPA) in Scotland to dispose of sheep dip. Pump it out into a slurry tanker, and spread on a suitable piece of land (fairly flat, and well away from watercourses) at no more than 5000 litres/hectare (450 gallons/acre).
- Concentrated dip should be stored, like any other pesticide, in secure conditions, and never transferred to any other container.

REMEMBER:

If an employee is carrying out the dipping on your behalf, a COSHH assessment is necessary. In many ways it is better to rotate tasks. Refreshment breaks pose a serious contamination problem.

Table 3: Pour-on treatments for sheep

Chemical	Trade Name	Supplier	Ticks	Keds	Lice	Blowfly		Headfly	Meat Withdrawal (days)
						Prevention	Treatment		
Deltamethrin	Coopers Spot-on	Pfizer	√	√	√	×	√	×	35
Cypermethrin 1.25% (cis:trans/80:20)	Crovect	Novartis	√	×	√	√	√	√	8
Cyromazine	Vetrazin	Novartis	×	×	×	√	×	×	28
Dicyclanil 5%	CLiK	Novartis	×	×	×	√	×	×	40
Dicyclanil 1.25%	CLiKZiN	Novartis	×	×	×	√	×	×	7
Alpha-Cypermethrin	Dysect	Pfizer	√	×	√	√	√	√	28

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