Summary

- 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 sheep skins.
- The other common ectoparasites of sheep (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. 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 used to be 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 or from neighbours’ 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.

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 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.

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.
- There is also a range of videos showing the symptoms of scab some of which have been supplied to farmers.

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 edges 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 all can be assumed to be 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 (Environmental Agency in England and Wales) to dispose of sheep dip onto their land. The Agencies require a disposal plan or operational plan of the activities. This includes a map of the disposal area with a description of the underlying geology, hydrogeology and soil type, including the depth of the saturated zone and quality of ground water. They also require information on the composition and volume of the sheep dip and the frequency of planned disposal. 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 Order 1997

It is an offence under the Sheep Scab Order 1997 for owners or keepers of sheep to

- fail to treat sheep visibly affected with sheep scab and all other sheep in the flock; or
- move sheep visibly affected with sheep scab (except to enable animals to be treated or for immediate slaughter).

Prosecution for non-treatment could lead to a fine of up to £5,000. The legislation gives Local Authorities the powers to require treatment of visually affected sheep. Owners served with a notice must provide the Local Authority with a declaration from a private veterinary surgeon that this treatment has taken place. The private veterinary surgeon will require to attend the flock during treatment and to be paid for this by the flock owner. 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. Grazing committees also have the means to introduce such measures.

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 control and treatment of scab. Both the dips and the injectables include products which have a long-lasting action, and those which have a short action. The products with a long-lasting action both kill mites and provide protection against re-infection. Only these products may be used to treat sheep under the Sheep Scab Order 1997. Short action products kill mites but offer no protection against re-infection. When short action dips are used to treat sheep scab, the sheep must be dipped twice 14 days apart to achieve an effective kill. The three types of injectable products are:

(a) Invermectin; (Noromectin [Norbrook], Rymcomc [Young’s] and Panomec [Merial]) – two injection treatment.
(b) Cydectin; (Fort Dodge) – two injection treatment, one shot preventative, residual action and complies with Sheep Scab Order 1997; and
(c) Dectomax; (Pfizer) – one injection treatment.

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

- Dip or inject all sheep on your farm in the autumn or winter with dip or injection which has a long lasting action (See table 1). This is best done when a complete gather can be achieved.
- Arrange with your neighbours in the autumn so you all dip or inject your flocks within a period of 2–3 weeks.
- Maintain effective fences.
- Treat away wintered lambs before departure and monitor them closely during the away wintering period.

Action for sheep moved onto the farm

i.e. bought-in sheep including rams.
- sheep returned from market, summer grazing or shows.
- sheep arriving for wintering.
- sheep returning from away wintering.
- stragglers.

- Assume all sheep arriving on your farm could be infected with sheep scab.
- 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 (also see table 1).

In the event of an outbreak

- Confirm the diagnosis through your vet and local SAC Veterinary Centre.
- Warn neighbours and tell them when you will be treating.
Alert the suspected infection source.

Treat all sheep that could possibly have been in contact with the affected sheep or their fields.

If using short action dips or injections, move sheep to clean area after first treatment.

When using a non organophosphorous dip, or when it is possible that some sheep may have been missed, dip twice, 14 days apart.

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-bye 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 up to four days after treatment until all the dead mites and debris are lost. The long withdrawal periods for these compounds makes them generally unsuitable 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 MV and Border Disease.

Resistance

Resistance to SP dips has occurred. It is manifest as a total failure. In these situations, animals continue to exhibit symptoms of scab, i.e. they continue to rub. Should such an event occur, flockowners 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 the diagnosis is critical and 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. Resistance to the OP dip, Diazinon, is not recorded.

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.

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 or pyrethroid 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.

Endectocide injections have little effect on lice. There is also concern that lice in the U.K. may develop resistance to pyrethroid pour-on and dips 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 6 legs instead of 8 for the tick.

Keds in the U.K. have been largely eliminated by dipping and an infestation is very rare at the moment. Deltamethrin pour-on is licensed to control keds and whilst there are no claims, it is probable that endectocide injections would 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 females 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’. On farms where this disease is a problem, vaccination is advised.
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. 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 toxaemia. 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, 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 together with some pyrethroid dips. Stress and pollution can be reduced by the use of pour-on products. Pyrethroid pour-ons will treat blowfly strike and some will prevent it. Also extremely effective in preventing strike, but NOT treating it, are Cryomazine and Dicyclanil. These are pour-ons which contain an insect growth regulator that prevents the blowfly maggots developing.
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, applied between the horns or around wounds, of synthetic pyrethroid pour-on will prevent and reduce attack.

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**Conclusion**

Although responsible flockowners 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 available 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. There is a clear need for concerted industry-led action to control and eventually eradicate this menace to its present and future prosperity.
**Table 1: Scab treatment and control**

<table>
<thead>
<tr>
<th>Group</th>
<th>Chemical</th>
<th>Trade Name</th>
<th>Marketed by</th>
<th>Meat withdrawal period (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dips with long lasting action.</strong> They kill mites and provide approximately four weeks protection from a single dipping.</td>
<td>Diazinon</td>
<td>Coopers Ectoforce*</td>
<td>Schering-Plough</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Diazinon</td>
<td>Paracide Plus**</td>
<td>Animax (Battle, Hayward + Bower)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Diazinon</td>
<td>Osmonds Gold Fleece***</td>
<td>Bimeda</td>
<td>Virbac</td>
</tr>
<tr>
<td>Non Organophosphorus</td>
<td>High-cis-cypermethrin</td>
<td>Ecofleece</td>
<td>Bimeda</td>
<td>Virbac</td>
</tr>
<tr>
<td></td>
<td>High-cis-cypermethrin</td>
<td>Auriplak</td>
<td>Bimeda</td>
<td>Virbac</td>
</tr>
<tr>
<td><strong>Dips with a short action.</strong> These kill mites but offer no protection against re-infection. Double dipping 14 days apart is required to eliminate scab mites.</td>
<td>High-cis-cypermethrin</td>
<td>Crovect Dip</td>
<td>Young’s</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>High-cis-cypermethrin</td>
<td>Robust</td>
<td>Young’s</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Single injection treatment.</strong> This licensed product kills mites but offers no protection against re-infection. One intramuscular injection is required. Treated sheep must not be mixed with untreated sheep for 14 days.</td>
<td>Avermectin</td>
<td>Doramectin</td>
<td>Dectomax</td>
<td>Pfizer</td>
</tr>
<tr>
<td><strong>Two-injection treatment.</strong> This licensed product kills mites but offers no protection against re-infection. Two subcutaneous injections seven days apart are required. Only mix with flock after a further seven days.</td>
<td>Avermectin</td>
<td>Invermectin</td>
<td>Noromectin</td>
<td>Norbrook</td>
</tr>
<tr>
<td></td>
<td>Invermectin</td>
<td>Rycomec</td>
<td>Young’s</td>
<td>Merial</td>
</tr>
<tr>
<td></td>
<td>Invermectin</td>
<td>Panomec</td>
<td>Merial</td>
<td>Merial</td>
</tr>
<tr>
<td><strong>Two-injection treatment.</strong> This licensed product kills mites and provides 28 days protection against re-infection. A single subcutaneous injection provides protection but two injections 10 days apart are required for treatment.</td>
<td>Milbemycin</td>
<td>Moxidectin</td>
<td>Cydectin</td>
<td>Fort Dodge</td>
</tr>
</tbody>
</table>

**Notes**
- * Ectoforce is dispensed in sachets that dissolve in the dip tank.
- ** Paracide Plus is dispensed through a pump provided by the supplier.
- *** Osmonds Gold Fleece is dispensed using a special dispenser with a hand pump.
Control of Sheep Scab and Other Ectoparasites of Sheep

### 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 not be possible – in which case, it is important to choose a dip which protects as well as treats the flock. Encourage all members in common grazings to gather and dip at the same time, with the same product. 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.

#### Step 3 – Disposal (See SAC Technical Note T475)
- **Never** allow the contents of the dip bath to enter a soakaway.
- Obtain information 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 5,000 litres/hectare (450 gallons/acre).
- There are degradation systems for most dip chemicals licensed for scab in the UK. Consult the manufacturers for details. Diazinon can be degraded with slaked lime. The high-cis-cypermethrin dips are neutralised with hypochlorite solution or a specialised product supplied with the dip.
- 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

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Trade name</th>
<th>Supplier</th>
<th>Ticks</th>
<th>Keds</th>
<th>Lice</th>
<th>Blowfly Prevention</th>
<th>Blowfly Treatment</th>
<th>Headfly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delmamethrin</td>
<td>Spot-on, Coopers</td>
<td>Schering-Plough</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>High-cis cypermethrin</td>
<td>Vector</td>
<td>Young’s</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Provinex</td>
<td>Novartis</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Crovect</td>
<td>Young’s</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Vetrazin</td>
<td>Novartis</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
</tr>
<tr>
<td>Dicyclanil</td>
<td>Clik</td>
<td>Novartis</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

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