Control of Endoparasites in Organic Sheep Systems

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Disease and poor performance due to worms and fluke cause significant losses both to individual farmers and to the sheep industry as a whole. Worms cause ill thrift and death, with an estimated cost to the British sheep industry of £120 million a year. Liver fluke causes deaths, reduced productivity and rejection of livers at the abattoir, with an estimated cost to the industry of £13 to 15 million a year.

The major internal or endoparasites of sheep are coccidia, roundworms and liver fluke. As coccidiosis is largely a disease of intensively managed sheep, the disease is unlikely to occur on organic sheep systems, where stocking densities are low.

This factsheet will focus on the control of worms and liver fluke in organic sheep systems.

Organic animal production

Animal health in organic animal production is based on disease prevention without the routine use of veterinary medicines. So, in organic sheep systems, the control of roundworms and fluke cannot rely on the routine use of anthelmintics and flukicides, as tends to occur in conventional sheep systems. As a consequence, the control of worms and fluke is the most significant challenge to sheep welfare and productivity in many organic systems.

Parasite control on organic sheep farms relies on grazing management strategies, improving immunity to parasites and using effective treatments when they are needed.

Monitoring parasite burdens

A major part of internal parasite management is to monitor parasite burdens. This will help ensure that high levels of infection are detected before animal health and productivity has been significantly affected, and also help to limit pasture contamination with parasite eggs.

Monitoring for worms is most easily done by a combination of monitoring animal performance and by the use of faecal worm egg counts. In lambs, monitoring daily liveweight gain is the most useful measure of performance.

With fluke, monitoring tools include post mortem examinations, blood tests, abattoir returns and fluke egg counts. All farms should have a written animal health plan that includes a programme for parasite monitoring.
Grazing management

Grazing management strategies aim to limit exposure of susceptible animals to parasites. For worms, the main aim is to avoid exposing lambs to heavily contaminated pasture. For nematodirus, the main source of pasture contamination is the previous year’s lambs, so avoiding grazing young lambs on ground that carried lambs the previous year is the best method of control.

For other important worm species, such as Teladorsagia, deposition of worm eggs by periparturient ewes is usually the main source of pasture contamination for lambs. Ewes with single lambs are able to better maintain their immunity to worms, so pass fewer worm eggs than ewes with twins or triplets. So, less prolific breeds of sheep are better suited to organic systems.

Strategic dosing of ewes around lambing time may be agreed by organic certification bodies to help limit pasture contamination and reduce the need for treatments in lambs.

The number of infective worm larvae on pasture is usually highest in mid summer, with the peak varying by several weeks each year due to differing climatic conditions. At this time, usually mid to late July, lambs should be moved to pastures that have not carried lambs the previous year.

There will either be:
• Aftermaths not grazed by sheep since the previous autumn, or
• Pasture grazed by cattle in the spring and early summer, and not grazed by sheep since the previous autumn
• Alternative forage crops e.g. rape

Regular monitoring of lamb growth rates and worm egg counts will help to identify when the worm challenge is increasing and enable evasive grazing strategies to be used, rather than resorting to anthelmintic treatment.

Worm control in sheep is much easier on mixed farms than on sheep only farms. Most worms found in the UK, with the exception of Nematodirus battus and Trichostrongylus axei, are specific to sheep or cattle and do not cross infect. However, annual rotational systems with cattle are less effective for sheep than cattle, due to the periparturient rise in egg output in ewes. Mixed cropping also brings significant benefits to worm control, by facilitating the integration of new leys and forage crops into the grazing system.

The control of liver fluke is much less easily achieved with grazing management. On some farms, it may be possible to exclude sheep from areas of snail habitat from August until February, when the risk of acquiring infection is highest. However, in wet years, large areas may remain wet during the summer, and it will not be possible to avoid grazing potentially infected areas.

Sheep are able to develop immunity to worms following exposure. Immunity develops best when sheep are well nourished and exposed to relatively low levels of parasites. Lambs that are exposed to heavily contaminated pastures will have reduced feed intakes, and be unable to mount an immune response. Lambs grazing high quality forage, with a low to moderate worm challenge, will be best able to develop immunity. Trace element deficiencies, especially cobalt, will slow the development of immunity, and reduce the ability of the lambs to withstand the damaging effects of worms.

Ewes in late pregnancy and early lactation may have a reduced immunity to internal parasites, especially if they are carrying multiple foetuses. Feeding higher levels of protein to ewes in late pregnancy and lactation will improve immunity and reduce worm egg output. As noted above, ewes with single lambs maintain their immunity to worms better than those producing twins or triplets.

Genetics also influence immunity to parasites. Organic production systems favour self-replacing flocks, and farmers may select replacements that have a low dag score (reflecting how mucky they are and the number of times they need to be crutched) and have grown well. Such animals may be resilient, in which case, they may still be carrying significant worm burdens, but are relatively unaffected by them. Or, they may try to select animals that are resistant to worms – these animals will have grown well, have a low dag score, and also a low worm egg count. Some sheep breed societies now record an Estimated Breeding Value (EBV) for faecal egg count as part of their performance recording indices. Farmers selecting for resistance should select rams with a negative EBV for faecal egg count.

As noted above, the use of grazing management and selection of resistant or resilient stock is unlikely to be sufficient to control fluke in organic flocks with a known fluke problem. On conventional sheep farms in endemic fluke areas, control relies on the use of flukicides at regular intervals as determined by fluke forecasts. On organic sheep farms, if monitoring identifies a need for regular flukicide treatments, this may preclude animals from being sold as organic, and ultimately be unacceptable to the organic certification body. In these instances, it may not be possible to continue to farm sheep organically.
Treatment

In all animal production systems, animal welfare is paramount. If preventive measures in organic systems fail to control parasite numbers, it is vital that animals are treated promptly and effectively. It will usually be necessary to provide evidence of a need to treat (e.g. worm egg count results) to your organic certification body. Your vet may recommend that animals are treated with a product that has a long meat withdrawal period, so precluding marketing the animals as organic. However, the needs of the animal should always be put above financial considerations, such as the loss of any organic premium.

When considering drug treatments, consideration should be given to the fact that anthelmintic resistance is now widespread in the UK. The main problem is resistance to the benzimidazoles (group 1), but resistance to levamisole (group 2) and the macrocyclic lactones (group 3) is increasingly recognised.

SCOPS (Sustained control of parasites in sheep) guidelines aim to slow the development of anthelmintic resistance in the UK. Monitoring the efficacy of any worm treatments used is an important SCOPS principle. This can be done most easily by carrying out a worm egg count before and after anthelmintic treatment. A representative sample is collected from treated animals at a set time after treatment as follows:

- 7 days for a benzimidazole (group 1)
- 14 days for a levamisole (group 2) or macrocyclic lactone (group 3)

The egg count should be reduced by 95% or more from a pre-treatment count for the anthelmintic to be considered effective. A lack of efficacy may be due to wormer resistance or a failure to treat correctly. Best practice when using anthelmintics includes:

- weighing animals and dosing to the heaviest in the group
- calibrating the drenching gun
- storing products correctly
- ensuring that drench is delivered over the back of the tongue

Regular monitoring of wormer efficacy is advised on all farms, whether conventional or organic.

Most organic flocks will be self replacing, so will only purchase a small number of animals each year. However, it is important that all purchased animals are quarantined and treated to prevent them bringing in resistant worms or fluke. SCOPS guidelines recommend sequential treatment on arrival with monepantel and moxidectin for quarantine worming.

Sheep should be held off pasture for at least 24 preferably 48 hours after treatment, and then turned out onto pasture that has recently had sheep on it. If there is a risk of bringing in scab, the moxidectin is best given as the 1% injection. When considering quarantine treatments for fluke, the source of purchased animals should be considered. If possible, do not purchase animals from known fluke infested areas. To reduce the risk of bringing resistant fluke onto farms with known snail habitat, purchased sheep may be treated either with triclabendazole or closantel. If triclabendazole is used, this should be followed by a drench check test to ensure there are no resistant fluke present. If closantel is used, two treatments 6 weeks apart are needed to ensure all fluke are removed. Treated animals should be held off snail infested pastures until the quarantine programme is completed.
New approaches to internal parasite control include the use of:

• Forages with high levels of condensed tannins e.g. chicory, birds foot trefoil. These have been shown to reduce worm egg output in lambs. It is not clear whether the effect is due to a direct effect of the tannins on the worms, or whether it is due to improved nutrition;

• The Moredun Institute is developing a vaccine against *Haemonchus contortus* worms. This is currently under trial in Australia;

• The first dual active anthelmintic has been released in the UK in 2012. This contains a macrocyclic lactone (group 3) and a new product derquantel, a spiroindole (group 5). Dual and multi-active products are widely available in the southern hemisphere where they are used in an attempt to control multi-resistant worm species. The use of a dual active product in organic systems would likely only be justified where multiple resistant worms have been shown to be present.

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