Protect your flock by mastering the art of 'farming' parasites

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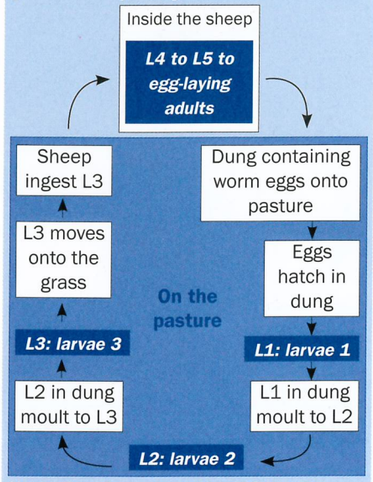
Controlling sheep parasites is widely considered to be one of the largest issues facing the industry today. To have any hope of tackling the problem we need a sound knowledge of the life cycle and epidemiology of the various parasites important to sheep production.

With the exception of *Nematodirus battus*, common nematodes (roundworms) found in sheep have a largely similar lifecycle – *see diagram 1*. In appropriate conditions (when temperatures are in excess of 20°C and humidity is high), worm eggs shed onto the pasture can develop into infectious larvae in as little as three weeks.

Adult parasites within the abomasum of the sheep lay eggs, which are passed out in the faeces onto the pasture. The eggs then hatch, giving rise to the first and then second larval stages of the parasite (L1 and L2). When the parasite progresses to the third larval stage (L3) it becomes infective, and larvae at this point in their lifecycle migrate on to the herbage and are eaten by the sheep. Once eaten, these 'L3 larvae' develop into their final 'L4' larval stage, which occurs in either the abomasum or intestine, depending on the species.

Both the L4 and adult stages of nematode parasites can be pathogenic (cause disease) to the host, depending again on the specific parasite concerned. Typically, the damage is to the absorptive lining of the intestine and abomasum, although with some nematodes further production-limiting effects are seen in the host due to parasites feeding on blood (e.g. *Haemonchus contortus*).

Diagram 1: Basic nematode (roundworm) lifecycle



Notes: Time from egg hatch to L3 is two to 12 weeks depending on temperature and moisture. From L3 to eggs being produced is the 'prepatent period'. L4 can arrest its development in the winter in certain species. Diagram developed from an original by Novartis Animal Health.

Common signs of gastrointestinal parasitism are scouring, poor body condition, ill thrift and open/dull fleeces. However, the real issue is the huge economic impact that gastrointestinal parasitism has on production at a subclinical level. Even moderate nematode burdens will reduce daily liveweight gains, feed conversion efficiency and have a negative effect on appetite.

The challenge that we are facing is the development of an increasing level of anthelmintic resistance within the general nematode population in this country.

'Resistance' to an anthelmintic is defined by the medicine having an efficacy of less than 95%, determined by faecal egg count reduction tests. If we don't test for resistance then it's likely the detrimental effects on production will only be noticed when around 50% of the total worm population is composed of resistant nematodes – *see diagram 2*.

There are several factors that will affect the rate of development of resistance, and it is these key points on which SCOPS principles are based:-

1. **Whether the anthelmintic is effective:** Under-dosing can lead to a poor kill of nematodes and select for resistant worms. This is common with incorrect calibration of dosing equipment, underestimation of weight of sheep or poor dosing technique. It is also important to know your resistance status and select an appropriate worming product based on this information.
2. **How frequently a chemical group is used:** Repeated doses with the same anthelmintic group will continually select for the survival of resistant worms, having a compounding effect on their prevalence in the population.
3. **The proportion of the total worm population exposed to anthelmintic:** If the nematode population is almost entirely in the animal (i.e. there is a very small *in refugia* population) the selection pressure for resistance is high. For example, when lambs are dosed only the susceptible worms are killed, while the resistant ones survive; if those lambs are moved immediately to a clean pasture, the only worms carried over to the new, clean field are those that were resistant to the worming product used, which will go on to produce eggs. The general worm population on the new field will therefore be composed of almost entirely resistant parasites. It is therefore crucial to maintain an *in refugia* population of susceptible worms on your pasture.
4. **Quarantine protocol:** While not directly related to speed of resistance development, it is essential that you do not inadvertently buy in resistant parasites. Therefore strict biosecurity and quarantine is necessary.

Ewes and lambs can be protected through correct anthelmintic use and grazing management.

Diagram 2: Effect of resistance on sheep performance

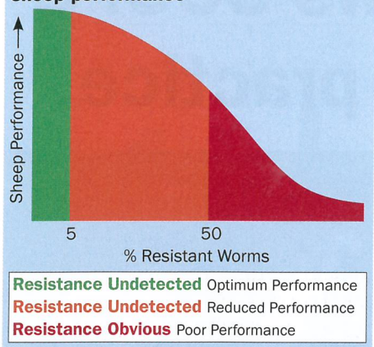


Image courtesy of SCOPS

In short, we are aiming to control parasites by using products that are always effective in reducing a parasite burden, whilst maintaining a susceptible *in refugia* population to reduce the speed of resistance development.

Faecal egg count reduction tests are one of the simple ways in which we can measure resistance, map its progress and develop farm-specific control strategies to prolong the efficacy of wormer groups. Faeces samples are taken from 10 marked individual animals for worm egg counting. They are then treated and egg counts repeated post-treatment.

In recent years there have been significant developments in the chemical groups available. These new groups need to be carefully integrated into any control strategy to preserve their use for as long as possible and reduce the speed of development of resistance in the UK.

Faecal egg counts can help determine whether anthelmintic treatment is required at all. Testing and good stockmanship can be used to effectively control the worm burden early in the season (so called 'early season suppression') and lead to lower pasture contamination levels later in the summer. This can be achieved by taking regular faecal samples once lambs reach five to six weeks of age. Sheep farmers who base their treatment regimens on this will see a reduction in use of anthelmintics overall, as well as reducing the selection pressure for resistant worms.

With a well-managed first grazing season involving sustained exposure to a low level of nematode larvae, adult sheep will develop a strong immunity to gastrointestinal parasites. As a result, adults in the flock should not require routine treatment. The necessity to treat such animals should be discussed with your vet, as good flock management can certainly be used to prevent the need to treat in the majority of cases.

Your control strategy may also include other methods of parasite control to reduce dependence on anthelmintics, such as careful grazing management to reduce pasture larval contamination at peak times of the year. For example, exposure of lambs to infective L3 larvae can be minimised by reducing finishing times, which also leads to lower overwinter survival rates of the larvae, and therefore reducing the challenge the following year.

Grass management

Grazing susceptible stock on low risk pasture will also help. For example, utilising new lays for weaning lambs onto, or using adult ewes with a strong natural parasite immunity to pre-emptively 'hoover' an existing ley before susceptible lambs are introduced onto it. Including cereals or brassicas in rotation will help to achieve 'clean' grazing, while the practice of mixed grazing with cattle can achieve a parasite dilution effect when such grazing isn't available. There is also an increasing interest in 'bioactive forages', such as chicory and sainfoin, which have been shown to decrease the effects of parasitism, although the mode of action behind how they achieve this is still not fully clear.

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