

# Factsheet: Sustainable Sheep Systems

## Worm Control in Sheep

**Anthelmintic Resistance (AR) is increasing. Sustainable control strategies must be adopted to control worm infections, while maintaining a population of susceptible worms. Worm control is a year-round issue and requires proactive planning.**

### Key Recommendations:

- Regular Faecal Worm Egg Counts should be conducted to monitor sheep worm burden.
- Sheep performance indicators such as lamb DLWG can also be used to give an indication of worm burden and the effectiveness of treatment, as well as to select animals for treatment.
- Ensure the efficacy of anthelmintic treatment by testing for AR.
- Know your anthelmintics – select the right anthelmintic, for the right animal, at the right time, administered in the right way.
- Utilise alternative control measures to reduce the need for anthelmintic use.



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## The Aim

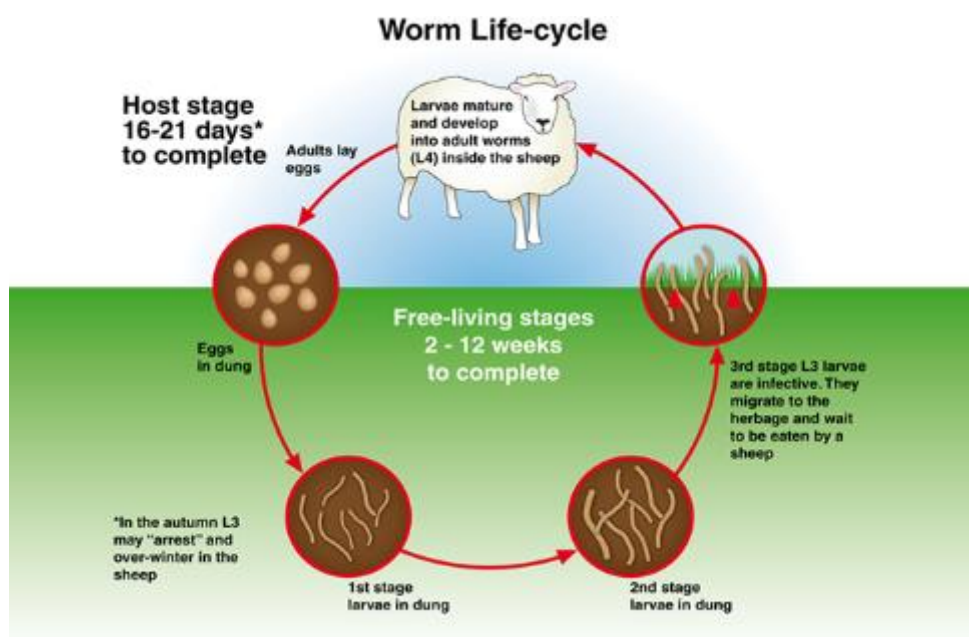
The aim of a sustainable worm control policy is to maintain a population of worms that are susceptible to anthelmintics. Susceptible worms are preserved within an “in refugia” population. Worms “in refugia” are not exposed to anthelmintics and include worm larvae on pasture and worms within untreated sheep.

## The Problem

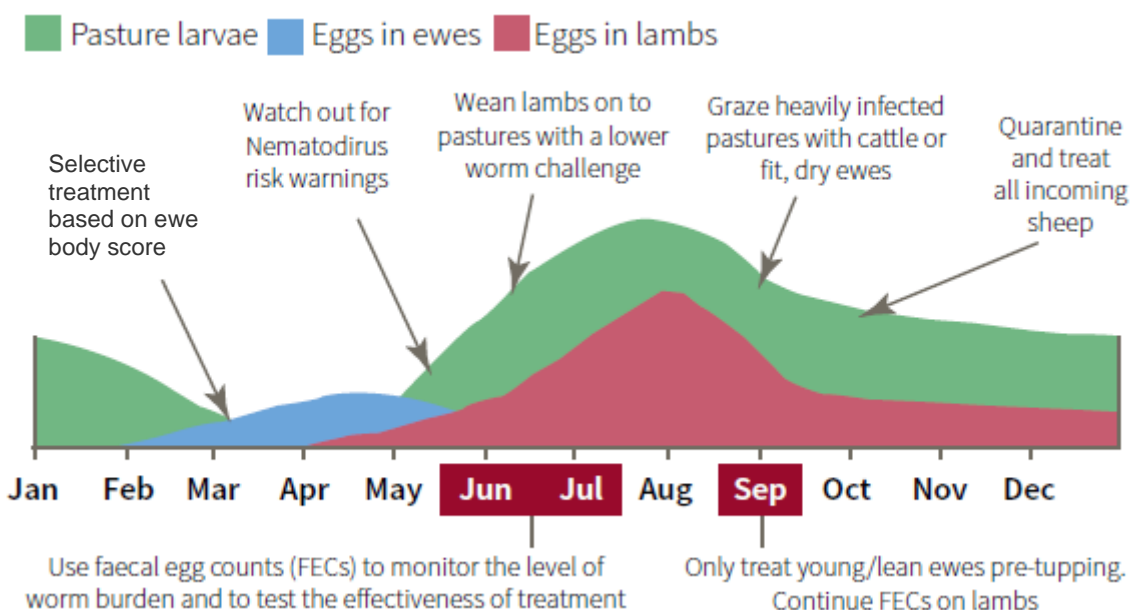
Worm infections can have a serious effect on the profitability of sheep enterprises, with costs to UK sheep producers estimated to be in excess of £84 million per annum in treatment and lost productivity (Nieuwhof and Bishop, Animal Science, 2005). Anthelmintics are a cheap and effective control measure commonly used by farmers. However, anthelmintic resistance is increasing in Scotland despite industry efforts to counteract it. Sustainable control measures for parasites must be adopted to slow the development of AR so that worm infections can be controlled in future.

## The Parasites

Understanding the life cycle of worms is key to developing sustainable control strategies. The lifecycle of worms are very similar, with a few exceptions such as Nematodirus.



The basic lifecycle of a Parasitic Worm (SCOPS, 2020).



Worm Control in Sheep Booklet (QMS, 2017). The timing of events will depend on lambing date.

## Symptoms

Worm infections cause Parasitic Gastroenteritis (PGE). Subclinical infections can cause reduced appetite and poorer performance such as reduced milk production, poor wool growth and lower daily live weight gain (DLWG). Symptoms of more severe PGE include diarrhoea, weight loss, and death in some cases.

The severity of the symptoms are dependent on factors such as size of worm burden, age, nutritional status (particularly protein), immune status, concurrent disease, genetics and trace element status.

## Anthelmintics

Anthelmintics are therapeutic agents used to eradicate parasitic worms from the infected host. They are a relatively inexpensive way to ensure good control, when compared to the economic and welfare impacts of uncontrolled infections.

The different classes of anthelmintics are shown below;

Chemical	Spectrum	Teladorsagia & Trichostrongylus	Haemonchus	Nematodirus
1. White Group 1-BZ Benzimidazole	Broad	✓	✓	✓*
2. Yellow Group 2-LV Levamisole	Broad	✓	✓	✓
3. Clear Group 3-ML Avermectin/moxidectin	Broad	✓	✓	✓
4. Orange Group 4-AD Monepantel	Broad	✓	✓	✓
5. Purple Group 5-SI <sup>‡</sup> Derquantel	Broad	✓	✓	✓
Closantel	Narrow	✗	✓	✗
Nitroxylin	Narrow	✗	✓	✗

\* Still the preferred option for Nematodirus in young lambs, even where resistance to other worms exists.

‡ Only available as a dual active.

Anthelmintic products and the worms that they are effective against (QMS, 2017).

Further information about what anthelmintics are available at: <https://www.scops.org.uk/about/scops-know-your-anthelmintics-guide/>

## Anthelmintic Resistance (AR)

AR is the heritable ability of a worm to tolerate a normally effective dose of an anthelmintic. It is considered resistant if it survives exposure to the standard recommended dose of the anthelmintic. This ability to survive is passed on to the worm's offspring.

AR has been widely reported to Group 1, 2 and 3 anthelmintics. For example, a 2017 study found that almost 100% of surveyed farms in the Southwest of England were confirmed as having AR to group 1 anthelmintics (SCOPS, 2022). AR has also been reported to the newer Group 4 anthelmintics but is currently uncommon in the UK. As of March 2022, there are no reported cases of resistance to group 5 anthelmintics. Therefore, group 4 and 5 products form a crucial part of any strategy to remove resistant worms from a farm.

Populations of multi resistant worms are also becoming more common on UK farms. Populations of worms that are resistant to more than one group of anthelmintics present a severe risk to the ability to control worm infections.

## Factors influencing the rate of development of AR

There are many factors affecting the development of AR on farm. These factors include:

- Overuse of anthelmintics – the more you dose your sheep the more tolerant the worms can become.
- Under dosing - Failing to ensure worms are exposed to the recommended dose of the anthelmintic can lead to an increase in tolerance.
- Importation of resistant worms – sheep which are bought in can import resistant worms. Following good biosecurity protocols is crucial to mitigate this risk.
- Repeated use of anthelmintic products with reduced efficacy – when AR is already present, further treatments using anthelmintics, which some worms are resistant to, will only increase the population of AR worms.
- Treating at a time of low refugia – for example dose and move to low-risk grazing.
- Biotic potential – certain species of worms are more able to build up tolerance due their ability to produce large numbers of eggs as in the case of *Haemonchus*.

## Sustainable Control Measures

A combination of measures should be used to form a sustainable control strategy with the aim of reducing anthelmintic use, slowing the development of AR and maintaining a population of susceptible worms on farm.

### Biosecurity

Good biosecurity is crucial for farmers to protect the general health of their flock. It is particularly important to stop resistant worms from being imported onto farm to infect your pasture and your flock. Biosecurity steps that should be followed to reduce the risk of AR being imported are as follows:

1. Upon arrival any sheep which are new to your holding, including those which have been on rented ground, should be dosed with a group 4 or 5 anthelmintic as a minimum. See <https://www.scops.org.uk/workspace/pdfs/quarantine-procedures-and-treatments.pdf> for more information.
2. Yard or house for 24 or ideally 48hrs so that worm eggs are not passed onto pasture.
3. Turn out onto fields that are known to be contaminated with worm eggs and larvae.
4. Consider checking faeces for worm eggs 2 weeks post treatment.
5. Quarantine for at least four weeks on pasture away from the rest of the flock. This period allows some other diseases that the sheep are carrying to become symptomatic.



## Nutrition

Nutrition plays an important role in increasing the tolerance of your sheep to worm infections, this knowledge can be used to reduce the need for anthelmintic treatment. For example, mature sheep could be drenched based on their condition score. Research has also found that ewes in late pregnancy that are fed a ration with high levels of undegradable protein shed fewer eggs. Ensuring good lamb nutrition aids them in coping with a worm burden.

## Faecal Worm Egg Counts (FWEC)

Simple and cheap worm egg counts taken regularly, in conjunction with your vet, provide a lot of useful information. Primarily they should be used to decide whether the group of animals tested require drenching. FWECs can sometimes also reveal what species of worm is present, which may affect the anthelmintic product used e.g. if nematodirus is detected.

FWECs are a key part of testing for AR, being used in both the drench test and the faecal worm egg count reduction test. The drench test is the simpler of the two tests and gives a quick indication of the efficacy of an anthelmintic treatment, with faeces from 10 sheep following treatment being collected and tested.

The faecal worm egg count reduction test is a more accurate test in which several different anthelmintics are tested against a control group. The control group is used to allow the effect of any external factors to be eliminated. Ten to fifteen sheep are randomly allocated to treatment groups, a group is needed for every anthelmintic group that you want to test for AR. To test every anthelmintic group, you would require a minimum of 6 groups (60 sheep). FWECs are conducted pre-treatment for all groups and then again post-treatment (7 days for 2-LV and 14 days for 1-BZ, 3-ML, 4-AD and 5-SI). Anthelmintic resistance is suspected if the percentage reduction in the FWEC of the treatment group is less than 95%. (SCOPS, 2019).

## Targeted Selective Treatments (TST)

TST is a refugia centred anthelmintic control strategy, based on monitoring for indications of worm infection, such as reduced individual DLWG. This approach relies on the identification of individual animals, commonly through electronic identification (EID) tags and automated weighing systems. Only lambs that fail to meet the expected performance targets are dosed. Accurate weighing allows the correct dose of wormer to be calculated. This method is good practice and can significantly reduce anthelmintic usage across the industry, saving you money and slowing the development of AR.

## Assessing Pasture Risk

Another method which can aid in reducing the worm burden within your sheep and therefore reducing the need for anthelmintic treatments is low risk grazing. Pasture is assessed and assigned risk ratings based on its predicted contamination with infective larvae. This depends on its grazing history. For example, fields grazed by ewes and lambs in spring are high risk later in the summer. Fields grazed by store/ewe lambs in autumn/winter should be considered high risk the following spring. Low risk pasture includes fields that have not been grazed by sheep for 12 months, reseeds and silage aftermaths. Weaned lambs should be given priority access to low risk grazing.

The risk posed by high-risk pasture can be decreased by using fit weaned ewes in good body condition to “hoover” the pasture. These ewes will have good immunity to worms and many of the larvae they ingest will not survive to produce eggs. Cattle could also be used as the worm species that infect cattle and sheep are different. Mixed grazing utilising both cattle and sheep or alternating cattle and sheep on the same pasture can also reduce the level of worm challenge. However, target sward heights are different for cattle and sheep and the appropriate fencing and water troughs need to be in place.

## Alternative Forages

Researchers have looked at the possible benefits of plant species such as white clover, red clover, sulla, sainfoin, birdsfoot trefoil, and chicory with regards to reducing the need for anthelmintics in sheep. Sheep grazed on such forages have lower levels of infection. This has been attributed to a range of factors that vary depending on the forage grazed including differences in plant structure and sward micro-climate, tannin content and nutritional quality compared to a conventional grass sward.



Photo of Chicory

## Genetic Selection of Animals

Genetic selection is another tool in the armoury for sustainable control of worms. When purchasing tups and replacement breeding ewes utilise Estimated Breeding Values (EBVs) for faecal egg counts that have an improved resistance to a worm burden.

## Further Information

<https://nadis.org.uk/>

<https://moredun.org.uk/>

<https://www.scops.org.uk/>

<https://www.qmscotland.co.uk/sustainable-worm-control-sheep>

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Visit the FAS Sustainable Sheep Systems webpage to watch the webinar and access the other webinars, technical notes and podcasts produced through the series: [Sustainable Sheep Systems | Helping farmers in Scotland | Farm Advisory Service \(fas.scot\)](#)

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