

Parasite Control in Sheep: Four Key Actions

Sheep are commonly exposed to nematode (roundworm) challenge at pasture and on occasion this may lead to the development of a condition known as parasitic gastroenteritis. This is most often seen in first grazing season lambs and is characterised by a range of clinical signs such as diarrhoea, anorexia and sudden weight loss. Similar to other sheep-producing countries, attempts to control this parasitic challenge in Ireland has resulted in the widespread development of anthelmintic resistance. In this article, James O'Shaughnessy MVB, PhD, from the Central Veterinary Research Laboratory, Backweston Laboratory Campus, Celbridge, Co. Kildare outlines four key actions to help delay the development of further anthelmintic resistance on sheep farms here



A number of different roundworms such as *Haemonchus contortus*, *Nematodirus battus*, *Teladorsagia circumcincta*, *Trichostrongylus* spp. and *Cooperia* spp. can give rise to PGE in lambs (Craig, 2018). However, *Haemonchus* is not commonly reported in Ireland (Rinaldi *et al.*, 2015), whereas *T. circumcincta* appears to be the main species found in the abomasum in lambs in Ireland (Good *et al.*, 2006). Disease due to both *T. circumcincta* and *Trichostrongylus* spp. is mainly observed from mid-summer onwards.

The challenge with *N. battus* L₃ larvae may give rise to clinical disease that is mainly observed in late spring or early summer. This can be a severe disease of lambs six to twelve weeks of age, which become infected through ingesting large numbers of infective larvae present on contaminated pasture. The life cycle of *N. battus* is unlike that of other roundworms in that, typically, it takes almost a year before the egg hatches releasing the infective larvae. There is a mass hatching in spring when the soil temperature increases after a period of cold weather and disease most often occurs in April, May and June. Infection is characterised by profuse diarrhoea, dehydration and weight loss. Mortality can be high in untreated lambs. After ingestion, *Nematodirus* larvae invade the intestinal mucosa and in some cases death may occur even before clinical signs of diarrhoea are observed. Ewes are not affected. This disease is best prevented by keeping the current year's

lambs off pasture that was grazed by lambs or young calves in the previous year.

There are currently five classes of anthelmintics available for the treatment of PGE in sheep, two of which were introduced in the last ten years. However, their long-term effectiveness is under threat given the number of reports of the presence of anthelmintic-resistant roundworms, especially involving the benzimidazole (white wormers), macrocyclic lactone (clear wormers) and imidazothiazoles (yellow wormers) classes which have now become commonplace in most sheep-producing countries, including Ireland (Good *et al.*, 2012, Keegan *et al.*, 2015). Despite this, and given their importance as a PGE control option, they should be used sparingly and only on those most likely to be affected by parasitism.

WHAT ACTIONS CAN BE EMPLOYED TO DELAY THE DEVELOPMENT OF ANTHELMINTIC RESISTANCE?

A working group (see panel, Four Key Actions Working Group) established by Teagasc, and which also included colleagues from the Department of Agriculture, Food and the Marine (DAFM), the UCD School of Veterinary Medicine, the pharmaceutical industry and a private veterinary practitioner, identified four key actions farmers can take to help to delay the development of anthelmintic resistance (AR) on Irish sheep farms.

1) Use benzimidazoles to control *Nematodirus*

Benzimidazoles (white drenches) remain the treatment of choice and are effective against both larval and adult stages of this worm. The use of benzimidazoles as a first-choice treatment option will also help to limit the exposure of the other anthelmintic classes to worms such as *Teladorsagia* and *Trichostrongylus* at a point in the grazing season when treatment for these may not be warranted. This will help to preserve their efficacy and is especially important on farms where resistance to benzimidazoles occurs.

As there are no drenches with effective residual activity against *Nematodirus*, this means that as lambs continue to graze they can become re-infected with larvae again and as a result may need repeated treatments at two-to-three-week intervals.

The annual *Nematodirus* forecast released by the Department of Agriculture, Food and the Marine is also a very useful aid for farmers on deciding when to treat their lambs. This forecast is based on data collected and analysed by Met Éireann at 23 weather stations around the country and predicts when the peak hatching of *Nematodirus* eggs is likely to occur on pasture in the different regions.

2) Use faecal egg counts to determine when to treat and what products are effective on farm

Aside from clinical presentation and live weight gain estimation, there are relatively few diagnostic tools available to farmers that can be used to gauge potential parasite burdens. One such tool that is available is faecal egg count (FEC) whereby the egg output of stomach/gut worms such as *T. circumcincta*, *Trichostrongylus* spp., *H. contortus*, *N. battus* and *Cooperia* spp. are expressed as eggs per gram (EPG) of faeces. As the egg produced by the female *N. battus* is morphologically different to the others listed above, their count is reported separately. Thus, laboratory FEC reports have a single entry for strongyle eggs
(continued overleaf)

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CONTROL OF STOMACH WORMS
– *improving sustainability*

For the coming seasons we need to focus on four key actions that will help maintain a susceptible worm population and prolong the efficacy of commonly used anthelmintic products

- 1. Don't dose adult ewes for stomach worms unless there is a demonstrated need**
- 2. Use only products from group 1-BZ (white drenches) to treat *Nematodirus* in lambs**
- 3. Quarantine drench - prevent 'buying in' resistance on arrival to the farm**
- 4. Drench test/ Faecal egg count**

To find out more just scan the QR code below

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which includes a total count of all morphologically similar roundworm eggs (i.e., *T. circumcincta*, *Trichostrongylus* spp., *H. contortus* and *Cooperia* spp.), in addition to a separate *Nematodirus* egg count.

As the FEC value is expressed as a ratio, anything that changes the volume of faeces produced will alter its value. For example, in cases of inappetence the volume of faeces produced will be reduced. As a result, the FEC value will be increased. Conversely, animals with diarrhoea may have a reduced FEC as a result of the dilution effect from the increased faecal volume. It is also important to recognise that there is not a direct relationship between the total worm burden of an individual animal and their FEC value. In the case of *N. battus*, most of the pathogenic effects are due to the larval stages. Therefore, farmers should not rely on faecal egg counting alone as a basis for deciding when to treat. The ineffectiveness of faecal egg counting with regard to diagnosing *N. battus* infections is further compounded by the fact that this roundworm is a poor egg producer. As a result, it is difficult to estimate the adult worm burden based on faecal egg counting. Notwithstanding all of this, FECs remain a worthwhile aid for farmers to use when deciding on whether or not to treat a group of sheep for parasitism, provided other factors such as age, current animal performance, prior treatment history and grazing history are factored in. Furthermore, FECs can be used to determine the efficacy of a particular anthelmintic (wormer). At its most basic, sheep can be faecal sampled several days post-treatment (e.g., seven days post-treatment if levamisole is used or 14 days post-treatment if a macrocyclic lactone or benzimidazole product is used) to gauge the efficacy of the treatment used.

A more formalised approach is to conduct a faecal egg count reduction test (FECRT) whereby several classes of anthelmintics are tested concurrently, along with a control group. The FEC values pre- and post-treatment are determined so that the percentage reduction in FEC is calculated (i.e., treatment efficacy). Although many factors can affect the outcome of an FECRT (e.g., under-dosing, length of the inter-sampling interval etc.), the FECRT is a very good starting point for a farm parasite control plan as it provides information on what products are effective or ineffective on a particular enterprise.

3) Do not treat adult ewes for roundworms unless there is a demonstrated need

In sheep, both clinical and subclinical disease due to roundworm infections are mostly associated with first grazing season animals. This is a result of having no prior exposure to parasitic challenge. Although clinical/subclinical disease may occasionally occur in older animals, this is more the exception than the norm. Therefore, it is recommended not to treat adult ewes for intestinal worms unless there is strong evidence to the contrary such as elevated FECs, poor body condition scores or pallor of mucous membranes (if *Haemonchus* is present), as under normal circumstances they would be expected to have a strong acquired immunity.

4) Quarantine treatment of bought-in sheep with a wormer containing a new active

Aside from excessive treatment frequency and under-dosing, one of the more common ways in which AR can develop on farms is through the purchase of sheep carrying anthelmintic-resistant roundworms. It can also include situations where sheep have been grazing commonage and the risk exists on introducing these resistant roundworms onto the home farm. It is imperative that the product(s) used include a wormer containing a new active ingredient where the efficacy of the treatment is likely to be very high, thus greatly reducing the likelihood that resistant roundworms are introduced onto the farm. Following treatment, sheep should be held off pasture for 48 hours to allow all eggs that have been produced by the resistant worms to be shed.

CONCLUSIONS

As the sustainability of many sheep enterprises is threatened by the emergence of anthelmintic-resistant roundworms, the four key actions outlined above should serve as easily implementable and practical parasite control actions that will help to delay the development of further AR on sheep farms, thus contributing to a more sustainable farming sector.

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