IMAGE: bonciutoma / Adobe Stock

Figure 3. Mixed or alternate grazing with sheep can reduce infectivity for nematode infections, but may increase liver fluke risk for cattle.

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Of Worms Sustainably guidelines (www.cattleparasites.org.uk).

Quarantine

Quarantine is an important component of all helminth control programmes. To institute it, assess the parasite species present or likely to be present, and implement quarantine actions against other "non-present" species.

If practical, house purchase cattle and administer appropriate anthelmintic(s) for the target pathogens. This treatment may encompass a combination of compounds administered sequentially to target different worm species, including ML-resistant *Cooperia* species.

Faecal samples can be taken two to three weeks later to assess if treatments have been effective in reducing worm egg shedding. For liver fluke, quarantine should take a risk-based approach, and treatment with non-triclabendazole-based products administered.

As infected cattle can pass liver fluke eggs up to three weeks after worms are killed, treated cattle should be kept off pasture for four weeks. Any sheep brought on to a farm should be treated following Sustainable Control of Parasites guidelines (www.scops.org.uk/internal-parasites/worms/quarantine-treatments).

Panel 3. Questions to ask in developing a sustainable helminth control programme

- All cattle farms have gastrointestinal nematodes; are liver fluke and/or lungworm also present?
- What have weather conditions been like regarding to transmission of nematodes and fluke?
- How high risk are pastures? What type of stock are grazing particular pastures?
- What are the target worms and stages to target?
- Have diagnostics been performed? If so, what tests? What were the results?
- What products have been used previously? Consider their "effect".
- Has efficacy testing been performed? If so, what were the results?
- What is the farmer's attitude to changing his/her behaviour? What facilities and budgets are available to support a more targeted treatment approach?

Developing a control plan

A combination of good grazing management and strategic application of effective anthelmintics will minimise the impact of helminth infections. For nematodes, first and second grazing season cattle are the focus for control. As immunity to liver fluke is unlikely to be effective, cattle of all ages must be considered in control plans.

Based on this knowledge, a farm-specific plan should be designed annually with the aim of targeting anthelmintic treatments when required, based on parasite epidemiology and local factors (location, clinical history, season, recent weather, type and age of stock; **Panel 3**).

Diagnostic tests can be exploited to garner evidence of infection and results interpreted in the context of grazing and clinical and treatment history. Preferably, the programme should include tests to assess anthelmintic sensitivity.

Adult cattle will not normally require treatment for GI nematodes, but, in some instances, diagnostics may be used to provide guidance on the need to treat, especially in high-yielding dairy cows. On farms where liver fluke is identified, adult cows will require treatment in autumn/winter.

As already mentioned, availability of products for dairy cows is limited and milk withdrawal is product dependent. Where lungworm is identified, a routine vaccine programme should be followed for existing/incoming stock. Where it is not practised, cows and younger stock may need treating based on diagnostic testing.

A helminth control programme (**Panel 4**) should be an integral part of the overall herd health plan. Developing a reliable sustainable plan is not straightforward; the situation can change over time. In all cases, farmer awareness of clinical signs and regular performance monitoring should form the basis of the programme (**Panel 5**).

> Improved uptake of these programmes is required to prolong efficacy of the existing anthelmintics as, although under study, anti-helminth vaccines are a long way off..

Panel 4. Step-by-step guideline to sustainable helminth control

- Identify helminth risks and their potential to affect production parameters and health.
- Spend time (spring, mid-summer, autumn) assessing risks and considering effectiveness of recent control measures. Make short-term schedules for all pastures to reduce infection risk to susceptible stock.
- Spring assessment: decide on overall plan for anthelmintics and vaccines. Consider strategic application or therapeutic application of anthelmintics? If following the latter, implement regular weight monitoring and faecal egg count (FEC) testing in young stock to screen for level of contamination. Action must be taken quickly if a signal to treat is indicated by reduced weight gain or increasing FEC.
- Regardless of anthelmintic protocol implemented, growth targets should be set for young stock (and high-yielding dairy cattle) so they are fed appropriately and anthelmintics and grazing management implemented to meet set targets. Regular weight monitoring is essential in this respect.
- Once a year (ideally mid-summer for gastrointestinal nematodes, winter for fluke) assess the effectiveness of the anthelmintic products being used.
- Ensure the farmer is aware of all aspects of implementing best practice in the administration of anthelmintics relating to storage, dose rate and application of product.
- Ensure the quarantine programme is up to date and takes account of efficacy tests that have been performed.

Panel 5. Monitoring – the cornerstone of all sustainable helminth control programmes

- Observe daily for clinical signs, such as scouring, coughing, weight loss and anaemia.
- Measure weight regularly, especially weaned calves.
- Faecal egg count (FEC) test first-season grazing calves in the summer to establish levels of contamination on to pasture (note: FEC tests are poor indicators of intra-host burden). Use FEC tests to establish thresholds for anthelmintic treatment, taking into account local epidemiology and on-farm factors (season, grazing history).
- FEC or coproantigen test in the autumn and spring for fluke eggs. Detection of liver or rumen fluke eggs should prompt appropriate treatment application.
- Baermann test for lungworm larvae, where disease or incursion are suspected. Detection of larvae should prompt appropriate treatment application. Start the vaccination programme when vaccine is available.
- Serum antibody tests for *O ostertagi*, *D viviparus* and liver fluke provide specific information on parasite exposure at group level over the grazing season.
- Make use of online forecasting information, such as that published by the National Animal Disease Information Service (www.nadis.org.uk/parasite-forecast.aspx). This provides information and recommendations for treatment based on recent meteorological data.
- Scrutinise slaughterhouse results for liver fluke infection. If results are positive, implement treatment and environmental management control measures.

JACQUELINE MATTHEWS, an RCVS specialist in veterinary parasitology, has focused on helminthology research and teaching for more than 20 years. Her group works on equine and ruminant roundworms, and its research spans sub-unit vaccine development, anthelmintic resistance and epidemiology of helminth infections. Jacqueline has published more than 120 peer-reviewed research papers and numerous lay articles, as well as given many presentations to industry, stakeholder and scientific audiences. Thus far, her research has attracted more than £13 million in external funding, with highlights including discovery of an effective sub-unit vaccine for control of teladorsagiosis in sheep and development of a diagnostic ELISA for larval cyathostominosis. Jacqueline has taught or examined at most of the UK veterinary schools and holds a ministerial appointment on the UK Veterinary Products Committee. She is based at Moredun Research Institute in Edinburgh and is honorary professor at the University of Edinburgh's Royal (Dick) School of Veterinary Studies.

Zoetis launches Suvaxyn PRRS vaccine across EU

A MODIFIED live vaccine (MLV) against porcine reproductive and respiratory syndrome (PRRS) has been launched across the EU.

IMAGE: Zoetis

Zoetis rolled out Suvaxyn PRRS MLV in most countries in the union in January, describing it as an "innovative vaccine containing a modified live European PRRS virus strain, grown in a unique cell line for whole herd protection".

Suvaxyn PRRS MLV is said to offer the earliest piglet vaccination from the first day of age, securing immunity before the risk period, which can last until the end of fattening. Pig protection is established 28 days following vaccination and lasts for 26 weeks after vaccination in fattening pigs, and 16 weeks after vaccination in gilts and sows.

Monica Balasch, Zoetis associate director for global biologicals development, said: "In Europe, PRRS is known for severe impacts on reproduction, including lowering birth rates; increasing abortion, stillbirth, mummified and weak live-born piglets; and death.

"In clinical studies conducted with Suvaxyn PRRS MLV, we found excellent results vaccinating pigs from the first day of age. It is safe to be used as the earliest protection in piglets, and to protect the whole herd against PRRS, as it is also safe for use in gilts and sows.

"The new vaccine represents a flexible alternative to allow for new, customised PRRS control programmes developed by veterinarians for producers."

For more information, the European Medicines Agency's public assessment report is available at http://bit.ly/2DBPWqv