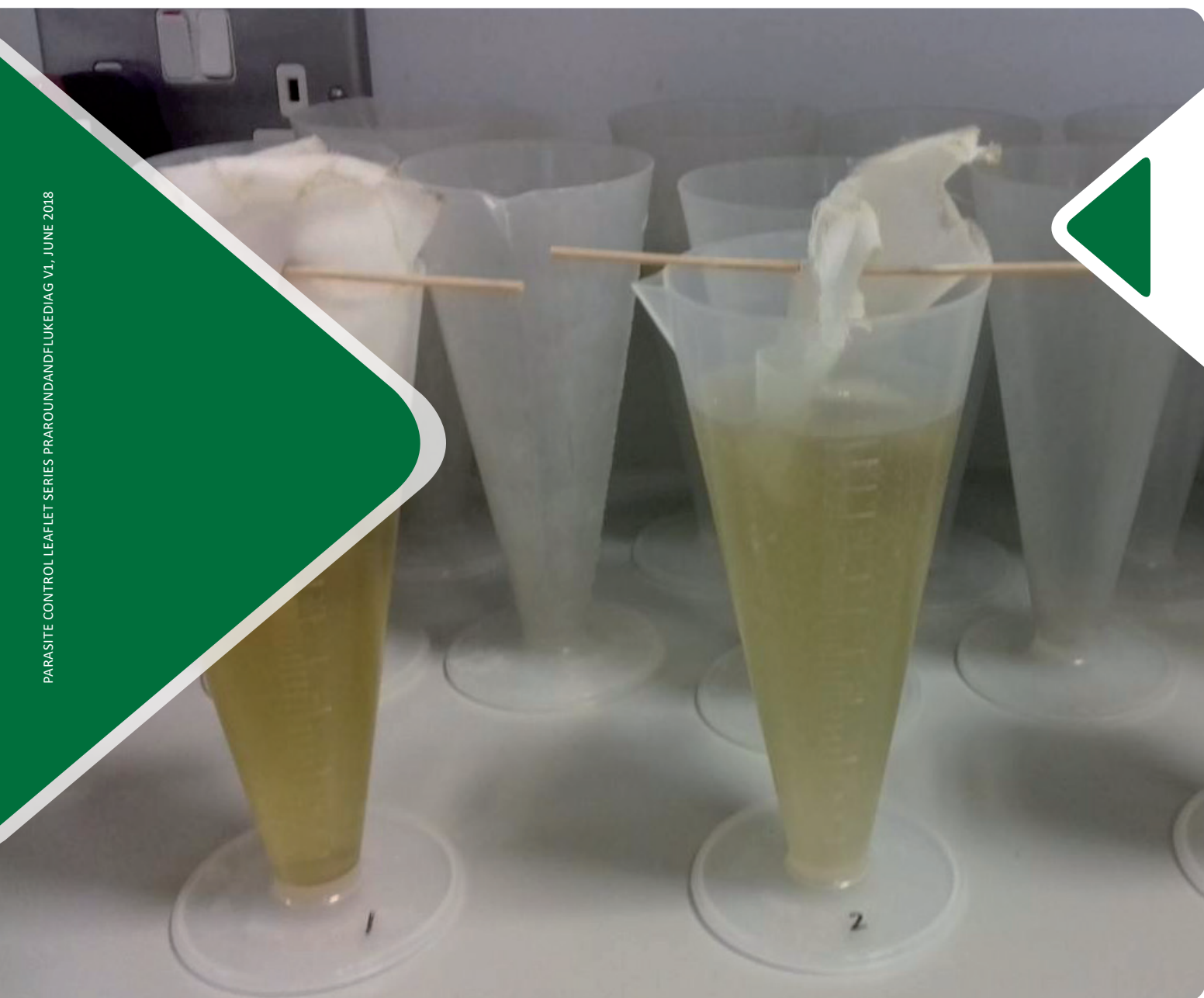


Practical Roundworm and Fluke Diagnosis



PARASITE CONTROL LEAFLET SERIES PRAROUNDANDEFLUKEDIAG V1, JUNE 2018

AHI gratefully acknowledges the financial and other contributions of our stakeholders.



PARASITE CONTROL PROGRAMME



Animal Health Ireland, 4-5 The Archways, Carrick-on-Shannon, Co. Leitrim, N41 WN27

PRACTICAL ROUNDWORM AND FLUKE DIAGNOSIS

This information leaflet briefly outlines the common sample types and diagnostic tests used by Irish veterinary practitioners and laboratories to investigate roundworm (stomach/gut worms and lungworm) and fluke (liver and rumen) infections in cattle.

For other important parasites please consult the Animal Health Ireland information leaflets:

Cryptosporidiosis in neonatal calves, Bovine coccidiosis- the facts, Redwater-the facts, Neospora caninum.



FAECAL SAMPLING

Collecting Faecal Samples

- Faeces may be submitted to a laboratory in a 30 ml screw cap plastic universal container. (Containers with push on caps are not suitable because gas production in the sample may cause the cap to become dislodged, thereby leading to spillage).
- Rectal faecal samples should be collected directly into a container. If this is not possible then animals should be closely observed and faeces should be picked off the ground as soon as they are passed.
- When testing for lungworm larvae, fresh faeces from the rectum should be used to ensure there is no contamination of the sample by free-living larvae.

SAMPLE SUBMISSION

- Samples should be either hand delivered to the laboratory or posted on the day of sampling. Ideally, samples should not be posted on Thursday or Friday to avoid samples being in the post over the weekend.
- If samples are taken at the weekend they should be refrigerated (not frozen) and sent on Monday.
- Individual samples should be placed in a leak proof and crush proof container (ziffy bag) and marked "Biological Sample" before being placed in the post. [Click here](#) for further information on postal services.
- It is important that samples are clearly labelled and correspond to the correct animal ID number(s).
- Where possible, provide a detailed history of the animal(s) being sampled. This history might include information on animal age, clinical signs if present, any prior treatments and details on grazing history etc. It is also important to state the reason for sampling (e.g. diagnostic, checking efficacy of a wormer).
- [Click here](#) to access a list of laboratories providing parasitological testing services.

VETERINARY TECHNICAL BOX

The prepatent period is the period of time between infection and eggs or larvae first being detected in faeces. Negative faecal tests will occur in animals infected with fluke or roundworms during this prepatent period when only immature parasites are present.

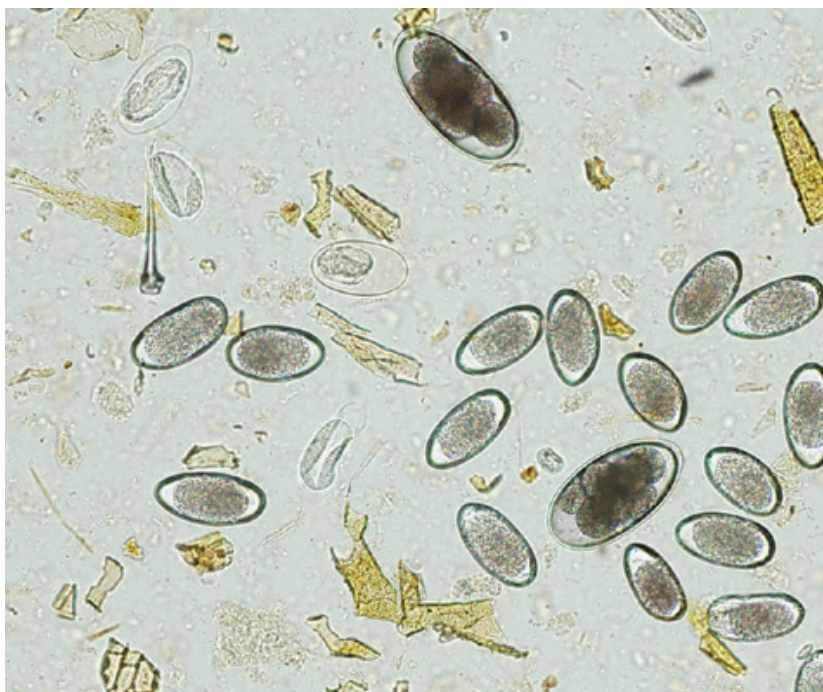
The approximate lengths of the prepatent period for the common helminths are as follows:

- 2-3 weeks stomach/gut worms
- 3-4 weeks lungworm
- 10-12 weeks liver fluke

The prepatent period for rumen fluke may be 12 weeks or more; however, this has not yet been verified under Irish conditions.

STOMACH/GUT WORMS

- Faecal egg counts (FEC) of stomach/gut worms are expressed as eggs per gram (EPG) of faeces. As FEC is expressed as a ratio, its value is affected by the volume of faeces produced. Therefore, in cases of diarrhoea where the volume of faeces can be greatly increased, the FEC value is lowered due to a dilution effect. Conversely, in cases of inappetence the FEC value may be increased as the volume of faeces produced is decreased.
- High FEC (e.g. ≥ 700 EPG) results may be indicative of a worm burden that necessitates the animal(s) being treated with an anthelmintic (wormer). However, low counts (e.g. < 200 EPG) may sometimes be found in animals suffering from disease/poor performance due to worm burdens. Therefore, it is important to recognise that FEC do not accurately reflect the total worm burden of an individual animal and it is advised to sample a number of affected animals in a group to aid an accurate diagnosis.
- *Ostertagia* is the main stomach/gut worm to affect animal health and performance and is a poor egg producer in comparison to some of the other stomach/gut worms. Conversely, *Cooperia* which produces relatively more eggs than *Ostertagia* is only of real significance in first grazing season cattle with large worm burdens. In reality, mixed infections tend to occur and it is impossible to tell, with the exception of *Nematodirus*, which of these worms is contributing more to a FEC as their eggs are very similar in terms of their shape and size.
- In cases of Type II ostertagiosis (caused by larvae which have been dormant in the animal's stomach over the winter and emerge in large numbers in the spring), egg counts will be low or negative despite heavy worm burdens.

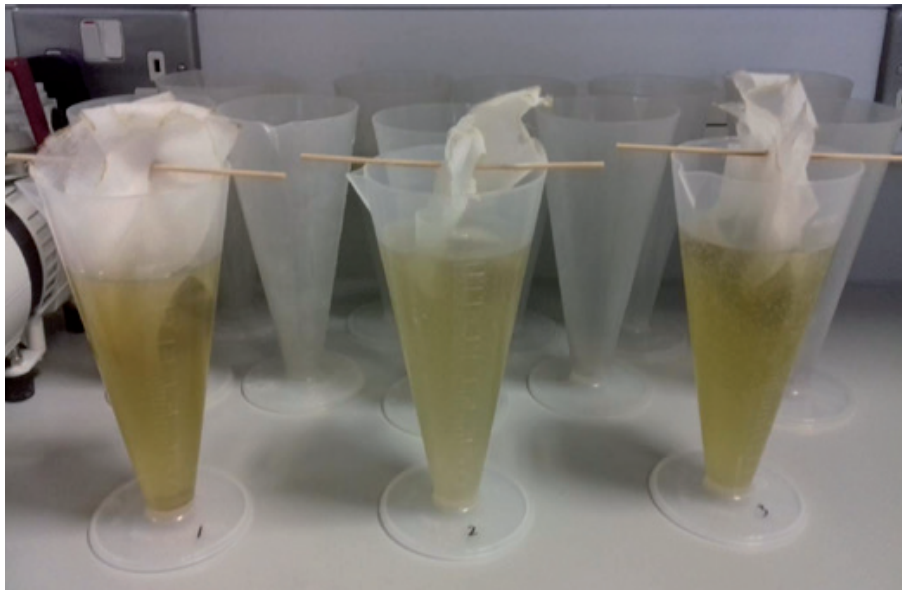


Strongyle and *Nematodirus* eggs (the larger egg) recovered in a faecal sample.

LUNGWORM

- Lungworm larvae are detected in faeces by the Baermann test.
- Ideally, this test should be carried out only on fresh faecal samples (<36 hours post-collection). If samples are not tested immediately, they can be stored in a fridge for up to 24 hours.
- False negatives: In cattle exposed for the first time to lungworm challenge, clinical signs (e.g. coughing, laboured breathing and even death in some cases) can occur before larvae are shed in faeces, while in the re-infection syndrome, which tends to occur in older animals, larvae are not shed in faeces. In both of these cases, the use of bronchoalveolar lavage may be warranted to aid a diagnosis (see below).

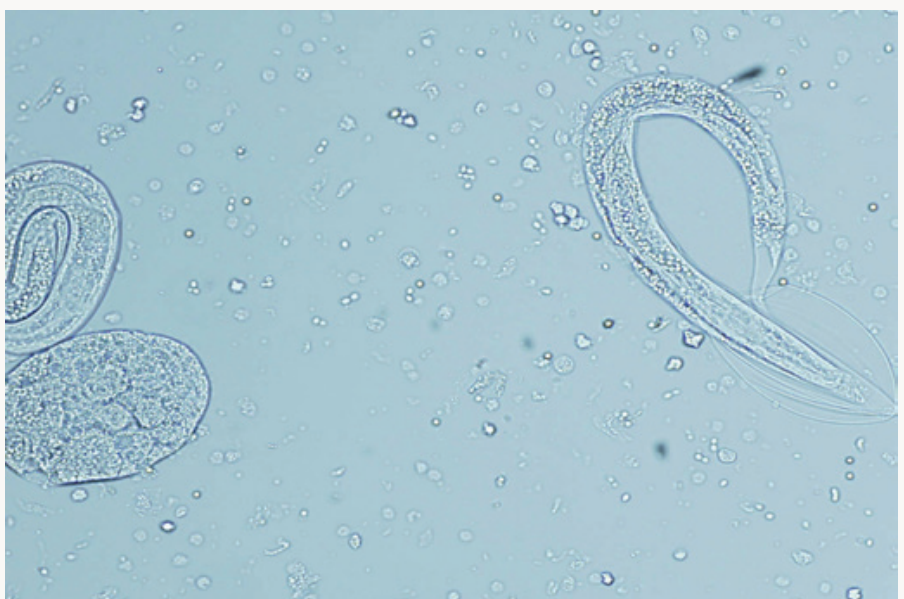
Further information on lungworm can be found in the Animal Health Ireland information leaflet.



Lungworm larvae are detected in faeces by the Baermann test.

VETERINARY TECHNICAL BOX

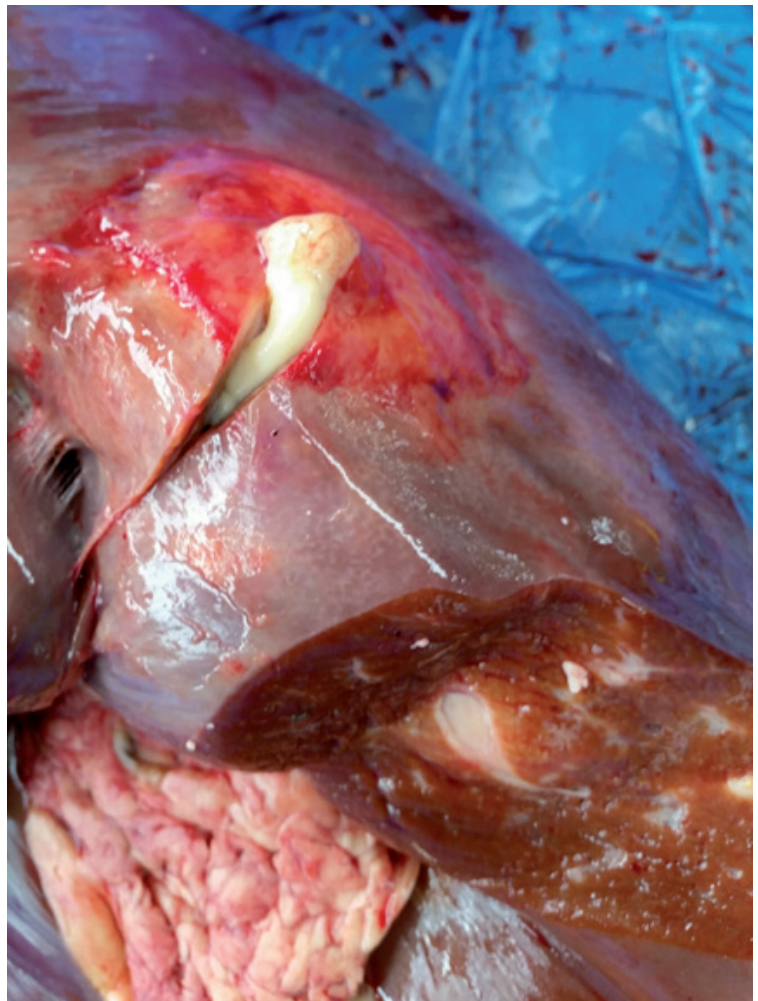
Bronchoalveolar lavage is a procedure whereby the lower airways are flushed with small volumes of fluid (saline). This fluid is then subsequently recovered, and in the case of suspected lungworm infections is examined for the presence of eggs, larvae and inflammatory cells (eosinophils). It is a particularly useful diagnostic aid where prepatent disease due to lungworm is suspected.



Lungworm larvae in a sample collected by bronchoalveolar lavage.

FLUKE

- Laboratory analysts can differentiate fluke eggs as belonging to either liver or rumen fluke.
- Liver fluke eggs appear erratically in faeces; an infected animal may shed eggs one day but not the next, so a number of animals within a group should be sampled. In addition, small numbers of eggs can be produced by large numbers of adult fluke. Therefore, finding eggs in one animal suggests that infection may be present in the entire group.
- An alternative faecal test for liver fluke, the faecal coproantigen test, can detect liver fluke infection during the latter half of the prepatent period when eggs are not yet being passed in faeces.
- Rumen fluke eggs may be present in the faeces of animals not showing clinical signs of disease (e.g. scouring, rapid weight loss), as adult rumen fluke which produce these eggs do not cause clinical disease. Thus, the detection of rumen fluke eggs in the faeces of animals that are thriving or producing well does not indicate that treatment for rumen fluke is necessary. On the other hand, acute rumen fluke disease can occur when no eggs are being shed in faeces. This is due to the presence of large numbers of juvenile rumen fluke in the small intestine. If disease due to juvenile rumen fluke is suspected, it is important to state on laboratory submission forms that faecal samples are to be tested for the presence of juvenile rumen fluke as well as for routine egg analysis. Testing for juvenile rumen fluke involves washing faecal samples through a sieve with apertures of an appropriate diameter and then examining the residue on the sieve for the presence of juveniles.



Liver abscess due to damage from liver fluke.

MILK TESTING

Tests for antibodies against the main categories of worms are commonly carried out on bulk milk samples. These tests, also called ELISA tests, are available for *Ostertagia*, liver fluke and lungworm.

A number of creameries carry out ELISA antibody tests on samples from the bulk tank; this obviously results in a sample selection of milking animals only and not others. To return a positive result from bulk tank milk, a certain percentage of animals must be producing antibodies against the parasite. This can range from 12% of milking cows for some liver fluke tests to 30% for tests for lungworm. These tests can also be applied to samples from individual lactating animals, but interpretation of results is less straightforward.

The antibodies produced in response to the parasitic infection can persist in the circulation for several months after the parasites have left the body; therefore these tests should not be used to determine the efficacy of treatment.

Scouring due to stomach/gut worms is generally associated with younger animals and rarely occurs in mature milking cows. A decision to treat cows for subclinical disease based on the elevation of antibodies in bulk milk samples should be discussed with your veterinary practitioner. Elevated liver fluke antibodies in milk can also be associated with reduced milk yield.

The antibody to lungworm detected by the current ELISA test is against adult worms only and therefore needs to be interpreted accordingly. Disease in adult cows is often due to the re-infection syndrome. Adult lungworm may be absent in the re-infection syndrome, and the bulk milk test will return false negative results if no animals in the herd have patent infections. See the Animal Health Ireland information leaflet: 'Lungworm- the facts' for more details [click here](#).



BLOOD TESTING

Occasionally blood testing may be carried out by a veterinary practitioner to investigate disease due to parasites.



Serology – antibody tests

- Requires clotted blood samples (usually a red topped blood tube).
- The types of tests used to detect antibodies in milk may also be available for the testing of blood samples. It should be noted that these antibodies will remain in circulation after the parasites have left the animals, so these tests should not be used post-treatment to determine treatment efficacy. Parasites for which these tests have been developed include *Ostertagia*, lungworm and liver fluke.

Haematology

- A fresh whole blood sample using EDTA as an anticoagulant is required (usually a purple topped blood tube), ideally submitted on the day of sampling.
- A differential white blood cell count can indicate if an eosinophilia (an increase in number of a particular white blood cell, the eosinophil) is present. Eosinophilia occurs in both parasitic infections and in cases of hypersensitivity. Haematology can thus suggest parasitic disease, but will not identify which parasite is present, and must be interpreted in conjunction with clinical signs and the results of other tests.
- Moderate anaemia may also occur in stomach worm infections and in liver fluke infection.

Biochemistry

Changes in blood biochemical parameters can occur as a result of parasitic infections; these will not give a definitive diagnosis on their own but can support a diagnosis. These tests are usually carried out on clotted blood samples (red topped blood tubes).

VETERINARY TECHNICAL BOX

- **Albumin** levels in the blood may drop during stomach worm and liver fluke infections and also in other conditions associated with ill-thrift. For example, acute rumen fluke infection caused by larval stages can also result in lowered albumin levels.
- A liver enzyme known as **GGT**, released when the bile ducts of the liver are damaged, will increase during chronic liver fluke infection. **GLDH**, which is released by damaged hepatocytes, is elevated when the liver parenchyma is damaged due to migrating juvenile liver flukes.
- **Pepsinogen** may be analysed in serum or plasma as an aid in the diagnosis of ostertagiosis. Thresholds vary from lab to lab but generally levels >3 IU of tyrosine (a marker of pepsinogen activity) indicate widespread abomasal pathology; older animals may show elevated levels when grazing contaminated pasture even though few incoming larvae are subsequently able to establish.

Interpretation of results of laboratory tests must always be viewed in the context of animal performance, clinical signs & necropsy results. If in doubt, consult your own veterinary practitioner.

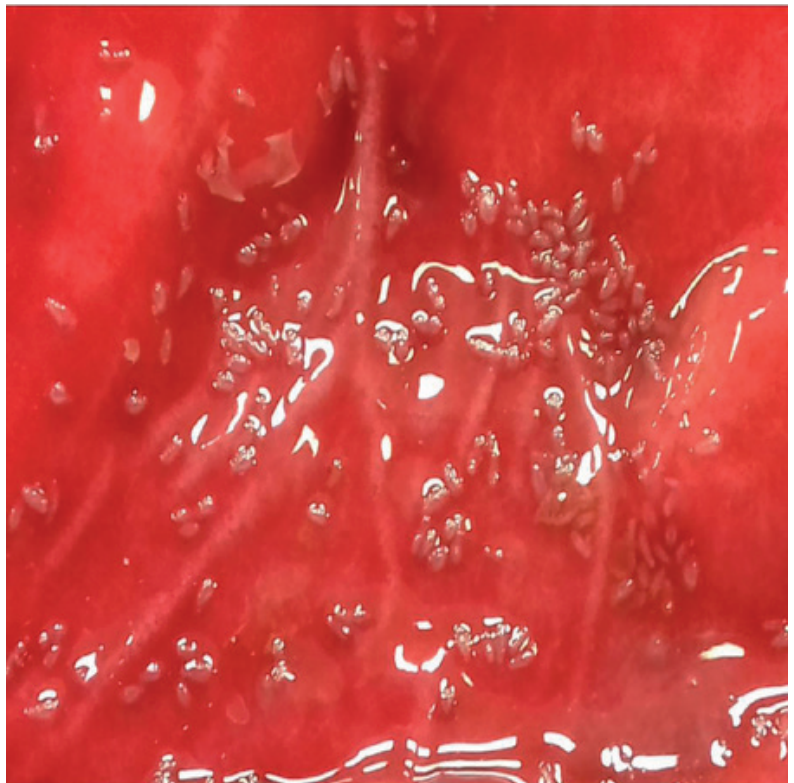
DRENCH TESTS

A drench test can help to determine the effectiveness of a wormer. Before conducting a drench test, ensure animals are accurately weighed and the correct amount of the dose is administered in a properly calibrated dosing gun.

- Collect faeces from a number of animals (15 is suggested) that have not been treated with a wormer for the previous 10 weeks. A FEC is performed before dosing, and then again at the following time periods after treatment:
 - Levamisole- 7 days
 - Benzimidazoles- 14 days
 - Macrocytic lactones- 14 days.
- A reduction in FEC of <95% of the pre-treatment value is suggestive of a lack of wormer efficacy if the correct dosing procedure has been carried out.
- When testing for the effectiveness of triclabendazole as a flukicide treatment, it is advised to faecal sample treated animals 21 days post-treatment.

NECROPSY RESULTS

- Parasitic disease due to stomach/gut worms, lungworm, liver fluke and rumen fluke may be diagnosed by necropsy. If animals die and the cause is not obvious, submission of a fresh carcase for necropsy to a regional veterinary laboratory will often yield a diagnosis.
- Information on the liver fluke status of slaughtered cattle is made available to producers by many abattoirs. This is a very useful way of monitoring the liver fluke status in a group of animals. See the [Beef HealthCheck programme](#) for more information.



Rumen fluke juveniles present in the intestine of an adult dairy cow on necropsy.

TECHNICAL WORKING GROUP

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