



## Disease Presentations

Disease caused by gastrointestinal nematodes may be acute in onset, with outbreaks of clinical disease in 10% of a flock or more, with some mortality. The devastating effects of such outbreaks on a flock are obvious. Gastrointestinal parasites also cause sub-clinical disease, with reduced growth rate, reduced milk and wool production and reduced body condition. Although far less dramatic, these insidious losses may involve large numbers of sheep for prolonged periods resulting in high costs to the industry.

The clinical signs of parasitism, caused by the gastrointestinal nematodes, fall broadly into two categories.

- ❖ Signs associated with gastritis and enteritis, typical of infection with *Teladorsagia* spp, *Trichostrongylus* spp and *Nematodirus* spp
- ❖ Signs associated with blood loss as a result of infection with *Haemonchus contortus*.

### **Teladorsagia (Ostertagia) spp**

Confusingly, the sheep nematodes previously referred to as *Ostertagia* spp have been reclassified as *Teladorsagia* spp, but they are still widely known by their previous name and the disease they cause, ostertagiosis, is still retained.

Ostertagiosis is characterised by inappetance, diarrhoea, dehydration, weight loss and death. As a result of the reduced feed intake and dehydration, the sheep appear 'hollow', with very little rumen-fill. Smaller burdens of parasites may be responsible for poor weight gains in the absence of clinical signs. The poor weight gains are a consequence of reduced appetite, reduced feed intake and losses of plasma protein into the gastro-intestinal tract. Disease results from damage to the abomasal mucosa caused by larvae as they emerge from the gastric glands where they develop, and by the presence of adult worms on the mucosal surface.

Ostertagiosis is typically seen in lambs during their first season at grass and usually occurs from mid-summer onwards, associated with the ingestion of relatively large numbers of infective larvae over a short period (type I ostertagiosis). In yearling animals during the winter months, type II ostertagiosis may occur as a result of the synchronous resumption of development of large numbers of hypobiotic larvae that were acquired during the previous autumn grazing.

### **Trichostrongylus spp**

Heavy infections of the small intestinal *Trichostrongylus* spp (principally *T. colubriformis* and *T. vitrinus*) cause inappetance, diarrhoea, rapid weight loss and death. The common name of the worm (black scour worm) describes the clinical picture. The disease is usually seen in store or replacement lambs during the autumn and winter months but can also occur in lambs from late summer onwards.

At lower levels of infection, poor growth rates, sometimes accompanied by soft faeces, are the common signs. Chronic infections of *T. colubriformis* are accompanied by reduced food conversion efficiency (FCE).

In the case of the abomasal parasite *T. axei*, diarrhoea, ill-thrift, weight loss and death can occur if large numbers are present.

### **Nematodirus battus**

Nematodirosis, due to *Nematodirus battus* infection, is an example of a parasitic disease where the principal pathogenic effect is attributable to the larval stages. Following ingestion of large numbers of L3 there is disruption of the intestinal mucosa, particularly in the ileum, although the majority of the developing stages are found on the mucosal surface. Development to L4 and then L5 is complete by 10–12 days from infection and this coincides with severe damage to the villi and erosion of the mucosa leading to villous atrophy. The ability of the intestine to exchange fluids and nutrients is grossly reduced and, with the onset of diarrhoea, the lamb rapidly becomes dehydrated. In severe infections, diarrhoea is the most prominent clinical sign. As dehydration proceeds, the affected lambs become inappetant,



diarrhoeic and thirsty, often congregating around drinking troughs. *N battus* is a major cause of parasitic gastroenteritis in lambs in the spring and on occasions during the autumn. **This pattern of events appears to be changing, presumably as synchronised hatchings of L3 occur both earlier, or later in the year than normally anticipated, and especially where these coincide with the presence of parasite-naïve or susceptible lambs. Click [here](#) for more information.**

### **Haemonchus contortus** ([see Chapter 3. Internal Parasites and Diseases, 3.1 Parasite Species, 3.1.4 Haemonchus contortus](#))

Infections with *H. contortus* are characterised by a regenerative anaemia due to the blood-sucking habits of the worms. Both larval and adult forms of the worm feed on blood and each adult worm is capable of removing about 0.05 ml of blood per day by ingestion and seepage from the lesions. A sheep with 5000 *H. contortus* may lose 250 ml of blood daily.

In acute infections, resulting from the ingestion of many infective larvae over a short period of time, animals are weak and are likely to collapse if driven. Pallor of the mucous membranes is striking, but it should be assessed by inspection of the conjunctivae rather than the oral mucosa or skin where differentiation from a normal appearance is difficult. Hyperpnoea and tachycardia are also present. The onset of clinical signs may be so sudden that affected animals are still in good body condition. Acute Haemonchosis can be a cause of sudden death.

In sub-acute infections, sub-mandibular oedema ('bottle-jaw') may develop as a result of hypoproteinaemia. Clinically, the condition can resemble fascioliasis. Chronic infections are characterised by a more general failure to thrive, with weight loss, poor body condition, sub-mandibular oedema, lethargy and weakness. The chronic nature of the blood loss leads to an exhaustion of iron reserves, and the development of a microcytic anaemia. The degree of anaemia can be assessed using the FAMACHA\* test. Diarrhoea is not associated with *H contortus* infection; in fact, affected sheep may be slightly constipated.

Haemonchosis can occur in both adults and in young sheep. When lactating ewes are affected there can be a profound depression of milk production leading to lamb deaths and to poorly grown lambs that depend on grazing for survival and then become, themselves, heavily parasitised. Over recent years, the incidence, frequency of reports and geographical range of haemonchosis have all increased possibly as a consequence of climate change. It can now be found in all parts of the UK.

**\*The FAMACHA®** is based on the evaluation of the mucous membranes of the conjunctivae using a 5 colour chart score (1 – normal to 5 – severe anaemia), with animals showing a score at 3 or higher selected for treatment. It is, however, only applicable for *Haemonchus contortus* infection and not the other trichostrongyles. FAMACHA colour charts are only available to certified individuals. Online certification is available from the University of Rhode Island (<https://web.uri.edu/sheepngoat/famacha/>).

### **Numbers of worms associated with disease**

If gastrointestinal parasitism is suspected as the cause of an outbreak of disease in a flock, a post-mortem examination and worm count should be performed, preferably on two or three animals. It is not sufficient to attempt to visualise the number of worms in the abomasum or small intestine because, with the exception of *H. contortus*, the worms are difficult to see and counts are impossible.

Field techniques for worm counts have been described and are highly recommended. As well as providing an instant diagnosis, they can be used by a veterinarian to demonstrate the parasites to the sheep owner. Immature worms will often be missed, or under-estimated, in field counts but will be detected in worm counts done in laboratories.

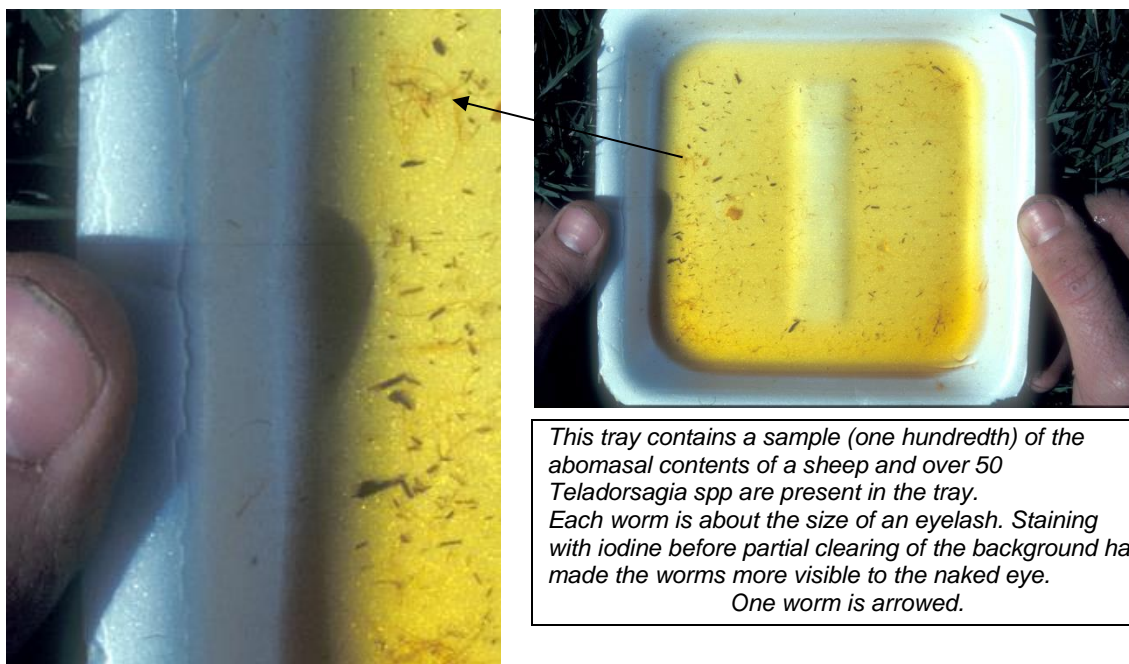
The numbers of worms present provide definitive evidence to support the diagnosis of parasitic gastroenteritis. In many cases, there are worms of different species present. Although the species vary in pathogenicity, it is acceptable to consider their effects to be additive. A points system has been developed as a guide to interpreting worm counts: -



**Table 20. Points system guide for interpreting worm counts.**

<i>Teladorsagia</i> spp	3000 worms = 1 point
<i>Trichostrongylus</i> spp	4000 worms = 1 point
<i>H. contortus</i>	500 worms = 1 point
<i>Nematodirus</i> spp	4000 worms = 1 point
Immature worms	4000 worms = 1 point

A total of **2 points** in a young sheep is likely to be causing measurable losses of productivity although clinical signs and deaths are unlikely unless the total exceeds **3 points**. In adult sheep, the thresholds will be correspondingly higher. This system is only intended as a guide. It is important to remember that, for some species, such as *N battus*, the immature worms are much more pathogenic than the adults.



**Figure 16. Demonstration of worm counts in field.**