



Haemonchus contortus

Haemonchus contortus is an abomasal blood sucking worm, described by Emery (2016) as the 'nematode nemesis of small ruminant production system'. This reputation is built on the ability of the larger L5 and adult worms to remove large quantities of blood (0.05ml/day) so a sheep with 5000 *H. contortus* may lose 250 ml of blood daily. This, combined with blood loss from the mucosa, produces acute disease caused by rapid anaemia with the risk of death even before the pre-patent period. The high daily egg output of adult females (5,000 – 15,000 eggs/day), combined with a short pre-patent period of 14-15 days and a 20 day life-cycle, means that levels of infection, given suitable weather conditions, can build on pasture very quickly resulting in acute disease.

Over recent years, the incidence, frequency of reports and geographical range of haemonchus has increased, possibly as a consequence of climate change coupled with sheep movements. Historically it was considered only to be a problem in the South East of the England, but can now be found in all parts of the UK.

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 poor growth rates. Lambs which then depend on grazing become heavily parasitized themselves, with further loss of performance and potential deaths.

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. Diarrhoea is not associated with predominant *H. contortus* infection and affected sheep may be slightly constipated.

In **sub-acute infections**, sub-mandibular oedema ('bottle-jaw') may develop as a result of hypoproteinaemia and clinically this can resemble fasciolosis. **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 by examination and/or the FAMACHA* test.

Where *haemonchus* is present on a farm, additional monitoring and management effort within the worm control strategy is required to minimise the risk of production losses and mortality. This is made more complex by the fact that haemonchosis is not normally a consistent threat, either within or between years. It tends to be sporadic, occurring when the climatic conditions combine with pasture contamination to produce a high challenge. Affected farms can go several years in between outbreaks, making it important that they understand the factors that combine to present a risk on their grazing areas and have monitoring in place.

Contrary to previous conclusions that adult sheep do not develop a strong acquired immunity to haemonchus, current thinking is that suppressive treatment regimes and/or the sporadic nature of the challenge reduce the ability of sheep to develop their immune response. There is also increased pressure for selection for resistance where suppressive regimes are employed (e.g. the original 'Wormkill' in Australia) because the L3 *refugia* population is lowered. Acute disease is also often the result of a rapid escalation in the ingestion of L3's and even in animals with acquired immunity, the challenge occurs too quickly for the response to be elicited.

There is also evidence that this species is adapting to climate (and management) change by changing mean egg size and optimum temperature for survival. The overwintering strategy of *haemonchus* is also changing from one of survival inside the host as inhibited (hypobiotic) larvae, to one where the L3 complete their development on ingestion. Reports from Australia show that on post-mortem, few inhibited L4 are now found in winter compared with studies in the 1970's, which explains why disease can now be seen year round, not just in the warmer months.

In mixed infections with *T. circumcincta* / *T. axei*, *Haemonchus contortus* is known to be compromised due to an increase in abomasal pH. This may explain why a high challenge in the early season can have such a devastating effect, if sheep have not had significant exposure to these other parasite species.



Control / management of *Haemonchus contortus* (*H. contortus*)

- The first line of defence is to prevent importation of this species on to a farm where it is not currently endemic. Quarantine and treatment of in-coming sheep (link) will remove susceptible and resistant parasites.
- The first sign that there may be a problem is often an unexpectedly high FEC count in ewes or lambs. Egg count highly correlated to the number of adult worms in the abomasum and with the high fecundity of *H. contortus*, a count of several thousand is common, compared to the *T.circumcincta* for example where counts of several hundred are more common.
- Confirmation of the presence of *H. contortus* can be done by PNA staining of eggs or larval differentiation techniques. Adult worms can also be seen with the naked eye in the abomasum on post-mortem examination.
- On farms known to be affected, careful monitoring and mapping of areas where infection levels are high is essential so that avoidance tactics can be employed.
- Sub-acute / chronic disease – markers include Body Condition score (BCS) and FAMCHA*. Flocks with access to EID and auto weighing equipment are also able to monitor weight change in ewes on a regular basis, which although at an early stage, may give them early warning of a pending challenge.

Vaccine - There are currently no vaccines for *Haemonchus* licensed in the UK. A commercially available vaccine * licensed in parts of Australia and South Africa induces high serum antibody levels to 'hidden' gut antigens of *Haemonchus* and manufacture of the vaccine involves harvesting extracts of the parasite's gut. Vaccination results in a reduction in egg shedding and disease in lambs, yearlings and ewes. This vaccine is being used successfully to help in the control of *H. contortus* in parts of Australia and S. Africa. Sheep require three priming doses of vaccine, followed by boosters every six weeks to six months depending on level of challenge.

**(Barbervax™) is commercially available in some countries but is not currently authorised in the UK. The use of the vaccine has not been evaluated in control programmes in the UK.*

Treatments

- In addition to the Broad Spectrum wormers, closantel and nitroxylin, narrow spectrum products are also effective against *H. contortus*, and these are the products of choice where this is the target predominant parasite. This is particularly important with regard to ewes where we are trying to minimise unnecessary treatment of other worm species.
- In case of sub-acute/chronic disease, targeted treatment of clinically affected animals, using the markers above, avoids blanket use and maintains *refugia*. This is important because AR is a major issue with *H. contortus* worldwide, often being the first species to develop resistance to an anthelmintic class.
- Weighing adult sheep to make sure the dose rate is correct is vital. Breed averages are often misleading making underdosing a significant risk. Each flock should weigh at least a sample of ewes to ascertain the heaviest weight for ewes and be prepared to split them if there is a wide range.

***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/>).

Ref: Emery, D.L. *et al* (2016) *Haemonchus contortus*: the then and now, and where to from here? Int



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