Gastrointestinal nematode infestations are perhaps the most important group of conditions limiting intensive sheep enterprises.

The important nematode infestations are:
- Nematodirosis in young lambs during the late spring/early summer
- Parasitic gastro-enteritis of growing lambs from mid-summer onwards
- Older sheep when control measures fail to be implemented correctly

Parasitic gastro-enteritis affecting growing lambs from mid-summer onwards

Emanation caused by failure to control PGE.

**Nematodirosis**

In the UK nematodirosis is an important disease affecting young lambs during the late spring/early summer months when losses can be high.

Nematodirosis is an important disease affecting young lambs during the late spring/early summer months. Sudden death and outbreaks of diarrhoea in surviving lambs can occur in young lambs grazing pastures contaminated with large numbers of larvae which develop from eggs deposited by lambs during the previous grazing season.
Sudden outbreak of diarrhoea in lambs caused by nematodirosis occur in young lambs grazing pastures contaminated with large numbers of infective larvae. Sudden deaths are not uncommon from nematodirosis in severely affected lambs. Only lambs are affected with nematodirosis, ewes do not show disease. There is acute onset of profuse watery diarrhoea in young lambs with faecal staining of the wool of the tail and perineum. The lambs are dull and depressed and rapidly develop a gaunt appearance with obvious dehydration and condition loss. If left untreated during the early stages of disease, deaths occur from dehydration and there is considerable weight loss in the remaining lambs. It is not unusual with severe larval challenge for 5 per cent of lambs to die within a few days. Convalescence following anthelmintic treatment is protracted with affected lambs taking much longer to achieve market weight.

**Treatment**
Sheep should be moved from infested pastures whenever possible. Anthelmintic resistance is not a problem with N. battus and Group 1 (BZ) anthelmintics are commonly used.

**Management/Prevention/Control measures**
Prevention is based upon avoidance of pastures grazed by lambs during the previous grazing season because adult sheep are highly resistant to infection and only lambs produce significant numbers of eggs. Anthelmintic prophylaxis timing is guided upon environmental temperatures and disease forecasts (follows NADIS monthly parasite forecasts and the SCOPS website). Typically, for lambs born from mid-March onwards in "normal risk" years anthelmintic treatments are given three weeks apart during May. In "high risk" years, three anthelmintic treatments are given extending the drenching period into June.

**Parasitic gastro-enteritis**
This section deals in general terms with parasite control in the UK. This is a rapidly changing area of veterinary medicine, especially following the introduction of monepantel (4-AD) and derquantel/abamectin combination (5-SI). These products are now both licensed as POM-VPS and available from SQP’s at animal health distributers.

**Clinical presentation**
Infestations usually cause
- profuse diarrhoea
- reduced performance
- weight loss
- emaciation in some cases
- anaemia in some cases
The important worms are:
- Nematodirosis (which has been described above)
- Teladorsagia (formerly Ostertagia)
- Haemonchus contortus
- Trichostrongylus

Haemonchus contortus is becoming a serious threat to intensive sheep production throughout the UK and not just south-east England.
In haemonchosis the most important clinical sign is anaemia.
The severity of clinical signs of parasitism depend upon
- age of the sheep
- current nutritional status especially protein intake
- immune status
- trace element status
- breed (genetic factors)
The classical signs of parasitic gastro-enteritis are observed in growing lambs exposed to large numbers of infective larvae during warm summer months.

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**Teladorsagiosis**
Disease is typically seen in growing lambs with profuse watery diarrhoea during mid/late summer causing dehydration and reduced weight gain/condition loss.

As a consequence of its blood feeding, haemonchosis presents with anaemia, submandibular oedema, and increased heart and respiratory rates; diarrhoea is not a feature of this nematode infestation. Ingestion of large numbers of larvae over a short period of time causes acute disease with lethargy, weakness, and rapid loss of condition. This form of the disease is more commonly seen in growing lambs. Ingestion of smaller numbers of infective stages over several weeks to months causes a more general loss of condition progressing to emaciation.

**Haemonchosis typically presents with anaemia and submandibular oedema.**

Haemonchosis in a Suffolk shearling - ingestion of large numbers of larvae over a short period of time causes acute disease with lethargy, weakness, and rapid loss of condition.
Diarrhoea is not a feature of haemonchosis.

**Trichostrongylosis**
Disease is normally seen during early winter, usually affecting 8 to 10 month-old lambs but also yearlings and adult sheep. The most prominent clinical feature is profuse dark-coloured, foul-smelling diarrhoea with much mucus present in the worst affected sheep.

**Diagnosis**
Teladorsagiosis and Trichostrongylosis

Faecal egg counts are routinely used to aid diagnosis of nematode infestations but have certain inherent limitations. Due to numerous factors the faecal egg count may not always accurately indicate the adult nematode population present within the gastrointestinal tract at that time because pathology can be caused by developing larval stages before infestations become patent and produce eggs.

By identifying only strongyle eggs, it is possible for less pathogenic species to make a disproportionate contribution to the total egg count. However, as a general rule strongyle egg counts above 5-700 epg are considered high and treatment is recommended. Your veterinary surgeon is the best person to guide you on your own farm situation.

**Haemonchosis**
Identification of anaemia is taken as a reliable indicator of haemonchosis in countries with endemic disease. Egg counts are often very high in patent infestations with counts greater than 10,000 epg not uncommon. At necropsy very large numbers of adults are visible on the surface of the abomasum (fourth stomach compartment) of untreated sheep.

**Treatment**
Treatment involves the use of an effective anthelmintic (please see later section detailing anthelmintic resistance).

The five major anthelmintic groups, defined by the active chemical, comprise:
- 1-BZ benzimidazoles, probenzimidazoles
- 2-LV imidazothiazoles, tetrahydropyrimidines
- 3-ML avermectins, milbemycins.
- 4-AD monepantel
- 5-SI derquantel and abamectin

Benzimidazoles such as albendazole and fenbendazole have a similar mode of action. Levamisole is an imidazothiazole. Preparations for sheep that contain avermectins include doramectin and ivermectin, and milbemycins such as moxidectin.

Closantel and nitroxynil can be used in situations where H. contortus is the major parasite.

It is essential that:
- a representative number of sheep are weighed before treatment,
- treatment is based upon the heaviest sheep in the group,
- drenching equipment is accurately calibrated.

These points are emphasised in Sustainable Control of Parasites in Sheep (SCOPS).

**Management/Prevention/Control measures for parasitic gastro-enteritis**

**Management**
With traditional management of sheep on permanent pasture in the UK, parasitic gastroenteritis in growing lambs results from ingestion of very large numbers of infective larvae from pasture during mid-summer. Teladorsagia circumcincta, and in warmer areas Haemonchus contortus, larvae appear first with Trichostrongylus spp. during mid summer. Pasture larvae arise from two sources:

- Eggs passed by ewes during the periparturient period. The reduction in host immunity permits a significant increase in egg production during the last two weeks of gestation which may persist until eight weeks post lambing. Under suitable environmental conditions these eggs develop to infective larvae within three weeks but maximum levels may not be present on pasture for up to six weeks. These larvae are the major source of infestations in young lambs.
- Young lambs may also ingest over-wintered infective larvae from pasture. The large numbers of eggs produced by these adult nematodes resident in the gastro-intestinal tract of young lambs results in the appearance of significant numbers of infective larvae on pasture during mid-summer. Clinical parasitism results unless appropriate action is taken.

**Control**

Control is based upon not grazing potentially heavily-infested pastures with susceptible lambs. Avoidance of infested pastures from July onwards can be integrated into some farm management systems by moving weaned lambs onto hay or silage aftermaths during mid June onwards. On some mixed farms, it may be possible to rotate pastures annually between cattle and sheep and operate a "modified" two year clean grazing system.

Anthelmintics can be administered to both ewes and lambs to prevent the build-up of critical larval populations on continually-grazed pasture but this is not sustainable because of selection for resistant strains.

The importance of good ewe nutrition during pregnancy and early lactation should not be underestimated with respect to parasitic gastro-enteritis.

**Use of prophylactic anthelmintics**

The rationale behind treating ewes is that it reduces the number of worm eggs she puts onto pasture when her immune system relaxes around lambing. Along with larvae that have overwintered, this will be the source of the worms that will challenge lambs later in the season. It is possible to differentiate between the ewes that put out many eggs from those that shed the least by faecal egg counts (FEC) and body condition scoring (BCS), therefore treatment can be selective.

*Anthelmintic treatment can be used to prevent the periparturient rise in egg output by ewes.*

The ewes that produce most eggs are generally the ones under the most pressure in late pregnancy. This includes ewes in lower body condition, younger ewes and triplet-bearing ewes. These are the priority to be wormed around lambing.

To reduce the risk of selecting heavily for resistance in the worms, it is generally recommended to leave 10-20% of ewes untreated. This means 10-20% in each grazing group, not just across the flock. However, producers that have been monitoring faecal egg counts are finding a much higher proportion can be left untreated if ewes are fit and healthy, without any detriment to lamb performance.

Independent UK research carried out by the Animal and Plant Health Agency (APHA), funded by the Veterinary Medicines Directorate (VMD) and published in 2018 found no advantage in blanket worming ewes at lambing. Faecal egg counts from lambs reared on ewes that were wormed with either a short or long-acting (persistent) wormer were not lower than faecal egg counts taken from lambs reared on ewes not treated with a wormer.

Tempting though it may be, routinely using persistent products year-on-year in ewes risk developing resistance to the clear (3-ML) group of wormers. To avoid this, these products need to be used carefully and the following points understood:-

- It is doubly important you leave 10-20% of ewes untreated if using a persistent wormer.
- The length of time the wormer persists is not the same across all worm species.
- Treating ewes will not have any effect on whether or not your lambs are at risk from Nematodirus.
- Do not use in ewes year-after-year and certainly not if ewes are going into the same fields as last year, or are being turned out onto low-risk pasture.
- Selection for resistance is a risk because suckling lambs are exposed to a low dose of the wormer via the ewes’ milk.

The timing of early season prophylactic anthelmintic
administration to control Nematodirosis has been discussed above but essentially comprises a strategic anthelmintic drench(es) depending upon disease forecasts. (see: www.nadis.org.uk and at www.SCOPS.org.uk) While such forecasts are reasonably accurate, your veterinary surgeon will advise regarding local conditions and specific risk periods.

Advice regarding early season prophylactic anthelmintic administration to control nematodirosis will be given by your veterinary surgeon.

A more integrated pasture management policy is overdue on most farms - consult your own veterinary surgeon as to how this goal can be best achieved on your farm.

What is the best strategy for this farm - individual farm sustainable PGE control measures will be drafted by your own veterinary surgeon

Tapeworm infestations
While segments of tapeworms are often seen in the faeces of growing lambs in the UK they exert no adverse effects on growth rate. Treatment is not usually considered necessary because tapeworms are non-pathogenic. Only members of the benzimidazole group (1-BZ) were previously effective against adult tapeworms but praziquantel is effective and now available though only in combination with LV anthelmintics.

Consult your own veterinary surgeon regarding quarantine drenching.

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