Factsheet

Detailed epidemiology of significant nematodes for grazing livestock

The species of nematodes found in the gastrointestinal tract of cattle and sheep are listed below. A few species are common to both cattle and sheep, but these are usually of low importance.

Significant parasites of sheep

Table 1: Gastrointestinal nematodes of sheep

Abomasum	Small intestine	Large intestine
Teladorsagia (Ostertagia) circumcincta	**Trichostrongylus colubriformis**	Trichuris ovis
Ostertagia trifurcata	Cooperia curticei	Chabertia ovina
Ostertagia leptospicularis	Bunostomum trigonocephalum	
Haemonchus contortus	Cooperia onchophora	
Teladorsagia davtiani	**Nematodirus filicollis**	
Skrjabinagia kolchida	**Nematodirus battus**	
Trichostrongylus axei	**Nematodirus spathiger**	
	Strongyloides papillosus	
	Capillaria spp.	

Trichostrongylus
With the exception of Nematodirus, the majority of gastrointestinal nematodes of sheep follow the general epidemiological pattern described above. However for two to three weeks before lambing, and for the first six to eight weeks of lactation, resistance to nematodes in ewes is reduced. This is known as the 'spring rise' or 'periparturient rise'. The effect is greater in multiple bearing/rearing ewes than in those carrying or rearing singles. This can lead to ewes contributing significantly to pasture contamination, particularly during the early part of the suckling period.

Nematodirus species
The most important feature of Nematodirus species is their capacity to survive freezing. Eggs deposited on the pasture in spring can remain viable through the following winter and a proportion can survive for over two years, even if fields are ploughed and re-seeded.

Nematodirus eggs hatch in response to specific conditions, resulting in the abrupt release of infective larvae onto the pasture. Classically, the timing of this hatch is dependent on a period of chill followed by warmer conditions and varies from year to year, usually within the April to June period. The hatched L3 has only a short, active life. In southern England there may be a second hatching period in the summer and autumn for eggs deposited during the spring. Hatching in this case

appears to be triggered by moisture after a period of dry weather and is not dependent on chill.

Ewes can contribute significant numbers of eggs to the pasture but do not usually develop clinical disease. The disease is therefore mainly transmitted from one lamb crop to the next. If the hatch occurs early in the spring, susceptible lambs may not be grazing sufficient quantities of herbage to acquire a significant infection. If the hatch occurs in late April or early May there can be a high risk to young lambs. When the hatch occurs late lambs may be sufficiently resistant to withstand challenge.

Typically, infection increases progressively on contaminated pasture grazed by ewes and young lambs every year.
Nematodirus problems may still occur where sheep and cattle are alternated on an annual basis. Without any detriment to them it is possible for young cattle (less than three months old) to recycle infection on the pasture.

Significant parasites of cattle

Table 2: Gastrointestinal nematodes of cattle

Abomasum	Small intestine	Large intestine
Ostertagia ostertagi	Cooperia mcmasteri	Trichuris spp.
Ostertagia leptospicularis	Trichostrongylus longispicularis	Oesophagostomum radiatum
Haemonchus contortus	Cooperia oncophora	
Ostertagia lyrata	Cooperia curticei	
Trichostrongylus axei	Capillaria spp.	
Skrjabinagia kolchida	Nematodirus helvetianus	
	Bunostomum phlebotomum	
	Strongyloides papillosus	

Ostertagia
Ostertagiasis is typically described as having two potential peaks: one occurring in the late summer and autumn and the other in the winter and early spring. The autumn peak has been referred to as Type I and the winter peak as Type II. In an ordinary Type I infection the ingested larvae enter an abomasal gland within six hours of ingestion. The larvae begin to grow causing enlargement of the gland. The larvae leave the glands after approximately three weeks and the mucosa recovers over the next couple of months. In general, calves turned out onto pasture carrying an over-wintering infection begin to pass worm eggs three weeks later. If the calves remain on the pasture they may be exposed to increasing levels of infection during the second half of the grazing season. In contrast, pastures grazed by beef suckler cows and their calves rarely develop dangerous levels of infective larvae

because of the diluting effect of the resistant dam. Spring-born, single-suckled calves which remain with their dams are not usually at risk of ostertagiasis.

In the winter form of the disease (Type II) the larvae remain in the abomasal glands in a phase of arrested development until the spring when they can resume activity, complete their development and cause Type II disease. Inhibition is greater in heavily infested animals and is also influenced by the immune response of the host. In addition, a period of cold autumn temperatures is required to condition the incoming larvae towards arrested development.

Some producers adhere to the concept of a three-week grazing rotation as a means of controlling stomach worms in cattle. However, development from the egg through to infective larvae can range from approximately 2–25 weeks, depending on temperature and moisture. In dry conditions, a dung pat containing nematode eggs can remain intact for months, with eggs and larvae trapped under its crust. Cattle will not graze within 15cm of the dung pat for a considerable period of time, and this distance can only be traversed by the L3 larvae in a film of moisture. In a wet summer there is ready emergence of L3 larvae from the pat, which could increase the risk of Type I disease. In a dry summer, the larvae are not released until the autumn. Depending on autumn temperatures, hypobiosis may be induced increasing the risk of Type II disease the following spring. In non-organic cattle systems the risk of Type II ostertagiasis appears to have decreased significantly as the effectiveness of modern anthelmintics against immature stages of the parasite has improved. In theory Type II could still be a significant risk to organic cattle, depending on summer grazing management and the extent of parasite burden at the start of the winter, however limited research carried out at ADAS Redesdale in 2002/03 did not indicate a problem of winter parasitism in the organic herds monitored.