

Parasitic Gastroenteritis – The Problem

- Main production limiting disease in UK sheep
- Reduced weight gain, diarrhoea and death
- Est cost of £4.40 per lamb; costing the UK industry £84m per year in 2005
- Primary pathogen is *Teladorsagia circumcincta* with other worm species also contributing.

Diagnosis, prevention and treatment

- Diagnosis is by clinical signs, time of year and faecal egg count (FEC)
- Prevention can be initiated with a flock health plan, unique to each farm
- Treatment involves anthelmintics; the most commonly used drug is ivermectin
- **Rising anthelmintic resistance makes control difficult.** Pre and post treatment FECs are used to give an indication of drug effectiveness on a holding.



Figure 1. A scouring lamb (left) and an infective larvae (right)

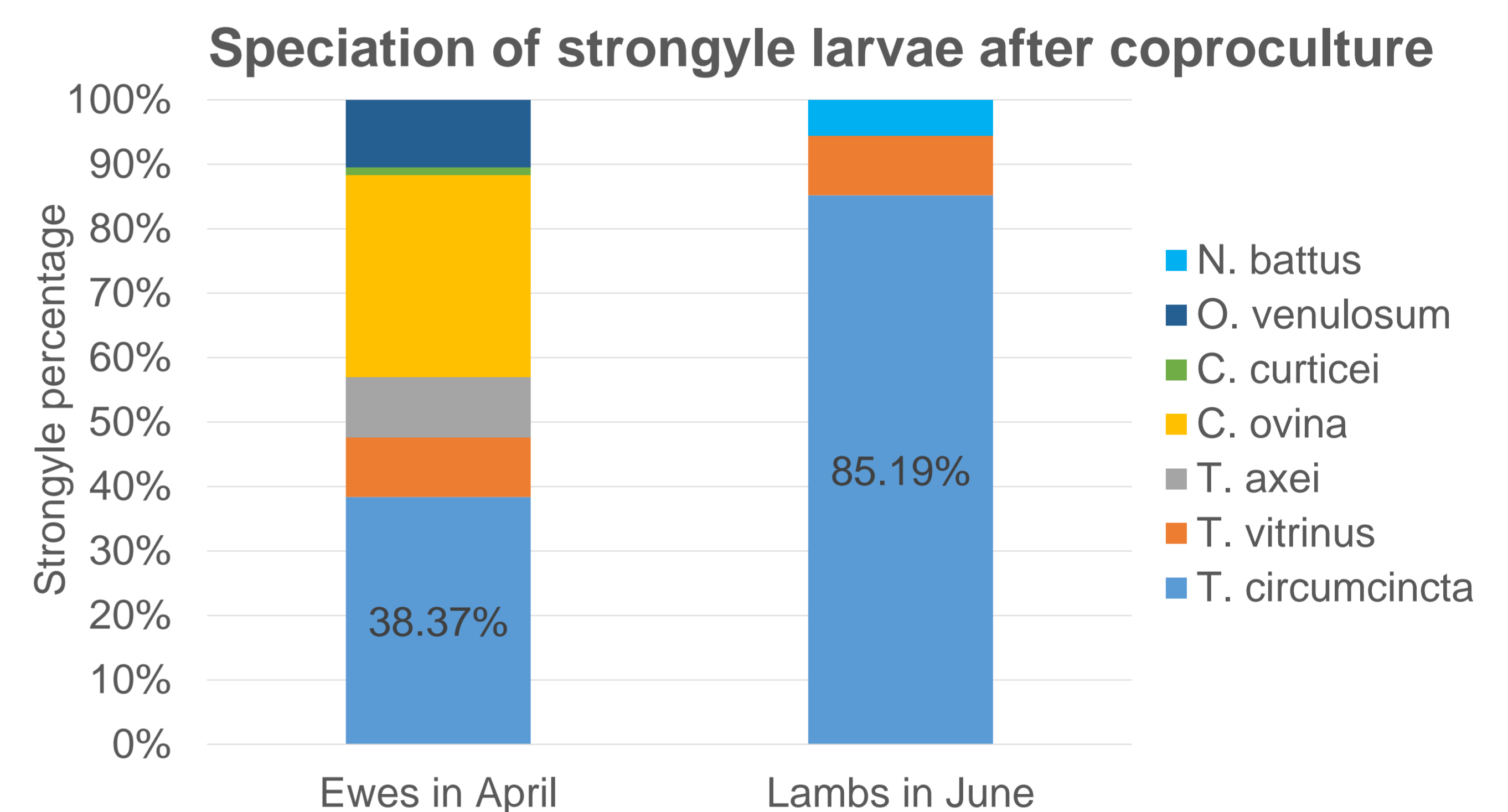
Faecal Egg Count Principles:

- Weigh, emulsify and sieve faeces
- Collect eggs from liquid
- Count strongyle eggs (includes *T. circumcincta*), *Nematodirus* eggs and note other species present
- Est cost £17 to £40



Hatching the eggs: Limits of the FEC 1

- Egg output per worm varies from species to species and can also be dependent on the pathogen mix.

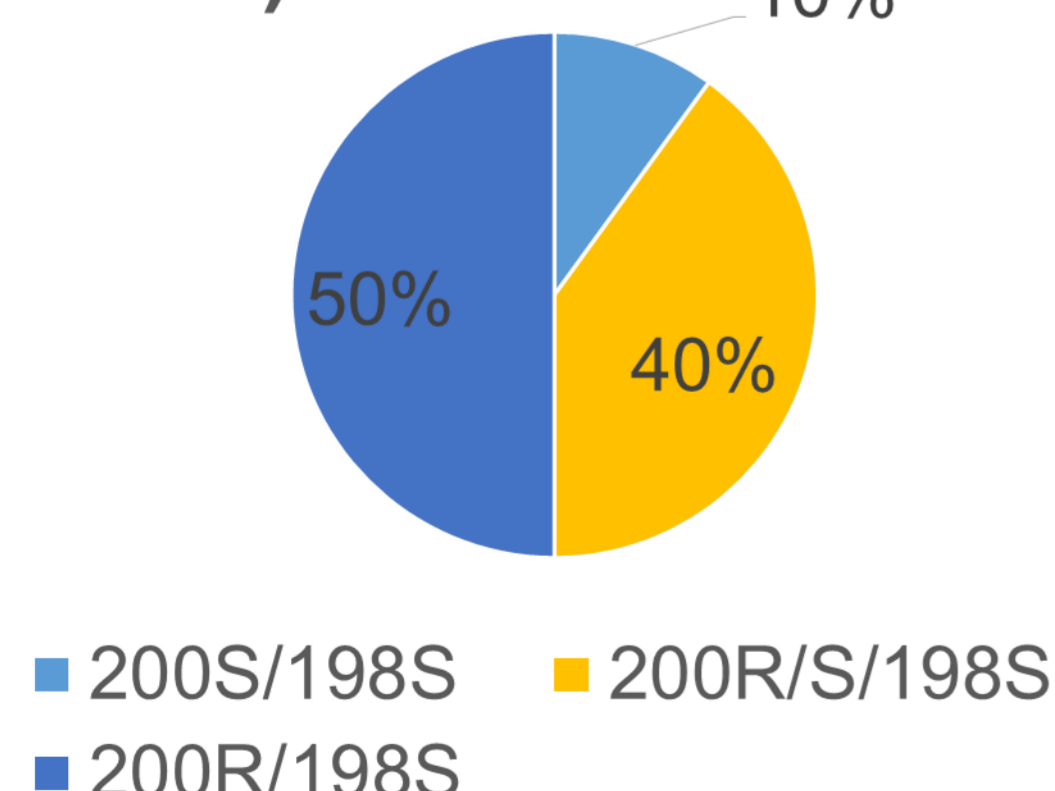


- **Pathogenicity varies between species;** over 40% of the ewes' egg output is from large intestinal species. Elimination of these will reduce the FEC post treatment but will be unlikely to significantly improve clinical disease.

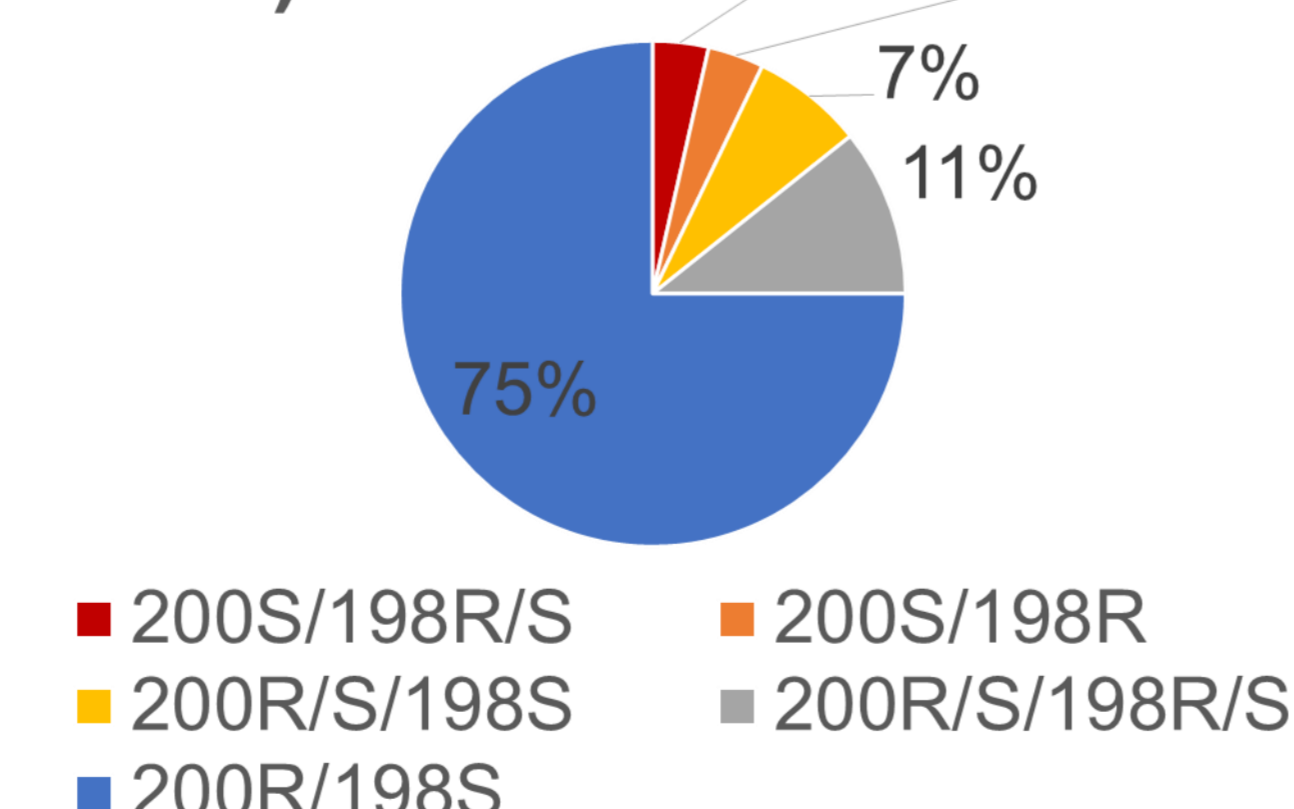
Hatching the eggs: Limits of the FEC 2

- Benzimidazole resistance is linked to mutations at three codons in the DNA. Sequencing of larvae from untreated ewes and albendazole treated lambs show:

Ewe *T. circumcincta* genotypes (30 larvae used)



Lamb *T. circumcincta* genotypes (28 larvae used)



- 10% of the ewes larvae are susceptible
- 100% of the lambs larvae are resistant to white drenches

What does this mean? What can we do?

- The FEC reduction test used to diagnose resistance requires careful interpretation: a FEC could drop by 50% just from elimination of highly fecund, low pathogenic, large intestinal species
- More in-depth diagnostic testing allows better informed decision making on farm: ask to have eggs cultured to L3 larvae for identification, or a PCR speciation carried out
- Currently we are able to detect benzimidazole resistance by PCR tests, but ivermectin resistance remains poorly understood
- My project aims to find genetic markers in *T. circumcincta* which could be linked to ivermectin resistance; allowing future tests to be developed for research and clinical use.

With thanks to the MRI parasitology team, N. Sargison and K. Hamer.
Ref: Bisset, S. A., et al. 2014 VP, 200,117-127; Skuce, P., et al. 2010 IJP, 40, 1247-55.