Fasciolosis caused by *Fasciola hepatica* – an increasing concern

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Fasciolosis - economic costs

• Estimated costs of disease – USD30 billion annually \(^{(FAO, 1994)}\), production losses in ruminants, sheep and cattle

• Total annual costs to the UK cattle industry have been estimated at between £40 and £300 million \(^{(Bennet and Ijpelaar, 2005)}\)

• Direct costs – disease losses, treatment costs

• Sub-clinical infections
The life cycle of *Fasciola hepatica*

- **Undifferentiated eggs** shed in faeces of definitive host.
- **Eggs** develop.
- **Miracidia** hatch and swim through plane of water to find snail, intermediate host.
- Stages of the fluke develop in the snail, after about 6 weeks, flukes break out of snail and encyst on pasture.
- **Intermediate host** are mud snails.
- Cysts on herbage are eaten by grazing herbivores.
- Adult fluke develop in liver of cattle and sheep.
- **Miracidia** hatch and swim through plane of water to find snail, intermediate host.
Factors affecting the life cycle of the liver fluke

- Warmth
- Moisture
- The development of snails and fluke outside the cow occurs in the summer in the UK
Fluke infection – a changing picture

- Evidence of increasing prevalence of *Fasciola* infection in UK
- Evidence that infection is spreading into new areas of the country

![Graph showing the increase in diagnoses of fasciolosis in cattle as a percentage of total submissions over time.](image)

**PAPERS & ARTICLES**

*Emergence of fasciolosis in cattle in East Anglia*

Fluke infection – a changing picture

• Why are we seeing an increase in prevalence and spread?

• Climate change
• Changing management practices (drainage and environmental schemes)
• Movement of livestock
What effect might climate change have on the prevalence of fasciolosis?
DRUG RESISTANCE
There is increasing evidence of resistance to triclabendazole in UK

- In collaboration with the AHVLA, developed a faecal egg count reduction test, to evaluate triclabendazole (Fasinex) failure in the field
- Twenty five farms in Britain tested
- Evidence of drug failure on seven farms
- Six in Wales, one in Scotland
## FECRT using composite faecal samples

<table>
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<tr>
<th>Farm</th>
<th>Pre-drenching faecal egg count</th>
<th>Post-drenching faecal egg count</th>
<th>Significant reduction in faecal egg count</th>
<th>Mean % reduction</th>
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<td>335</td>
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<td>-</td>
<td>65</td>
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</table>
DISEASE FORECASTING

• Improved disease forecasting
• Combine with stock and pasture management and strategic use of drugs
Can we improve disease forecasting?

- Nadis disease forecasting based on rainfall and evapotranspiration rate May to October; according to region (8 regions in England plus Wales and Scotland)

- Develop finer scale risk maps for fasciolosis

- Ideally at the farm level

- Allow treatment to be used strategically
Predictors for distribution of fluke

- Rainfall
  - Summer and autumn
  - Previous five years

- Temperature
  - Warm winters
  - Cool summers (= rainy)

- Physical factors affecting snail populations
  - Altitude, slope
  - Soil type (sandy), pH, minerals

Models explain about 78% of variation between post-code areas
Within one region, same climate but significant differences between neighbouring farms

Why?
Farm specific factors

- Presence of snail habitat and snails
- Drainage of pasture
- Month of turnout
- Stocking rates
- Type of watering area
- Presence of sheep
Other impacts of fluke infection
The effect of fluke infection on diagnosis of bovine tuberculosis

**ARTICLE**

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*Fasciola hepatica* is associated with the failure to detect bovine tuberculosis in dairy cattle

Jen Claridge¹, Peter Diggle¹,², Catherine M. McCann¹,†, Grace Mulcahy³, Rob Flynn³,†, Jim McNair⁴, Sam Strain⁴, Michael Welsh⁵, Matthew Baylis¹,† & Diana J.L. Williams¹,†
In areas where fluke is common, bovine TB is diagnosed less frequently.

A – Smoothed distribution of bovine TB
B – Smoothed distribution of *F. hepatica*
Implications

• The skin test is less sensitive in cattle co-infected with fluke and bTB
• Are fluke infected cattle more susceptible to other infections?
  – Salmonella Dublin
  – Johnes disease
  – Others?
Current funding opportunities

• Technology Strategy Board
• BBSRC – endemic diseases of farmed animals (LoLa)
• Animal Health Research Club (BBSRC, Industry, DEFRA)

  Pharmaceutical companies
  Levy boards and processors
  Farmers and producers

Combined, synergistic effort to address the key research questions

What are those questions?
Current issues

• Improved, rapid diagnosis (acute fasciolosis; infection in milking dairy cattle; differentiation between Paramphistomum infection and *Fasciola hepatica*)
• Treatment of dairy cattle – oxyclosanide
• Drug resistance
• Disease forecasting
• Stock and pasture management
• Vaccination
• Intra-breed innate resistance
• Susceptibility to and diagnosis of bTB and other infections
Acknowledgements

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