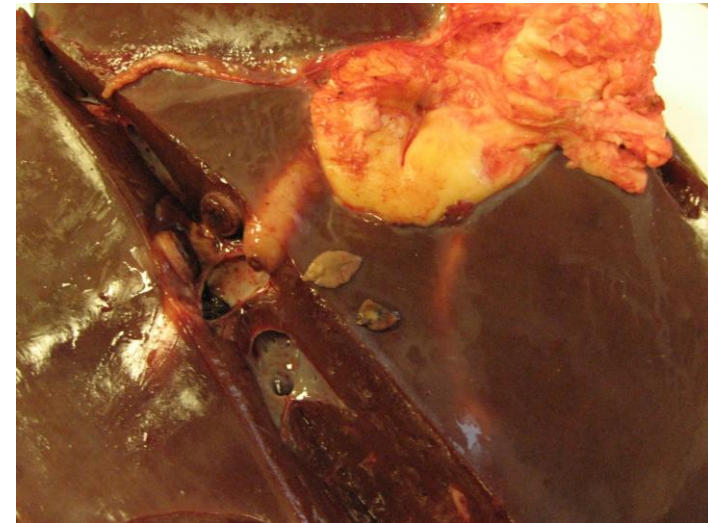


Fasciolosis caused by *Fasciola hepatica* – an increasing concern

Professor Diana Williams
School of Veterinary Science/Institute of
Infection and Global Health
University of Liverpool

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

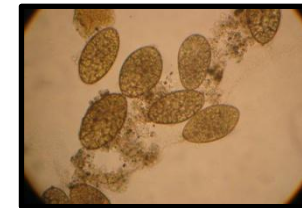
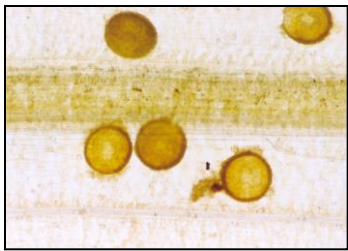


The life cycle of *Fasciola hepatica*

Cysts on herbage are eaten by grazing herbivores

Adult fluke develop in liver of cattle and sheep

Undifferentiated eggs shed in faeces of definitive host



Eggs develop



Miracidia hatch and swim through plane of water to find snail intermediate host



Intermediate host are mud snails



Stages of the fluke develop in the snail, after about 6 weeks, flukes break out of snail and encyst on pasture



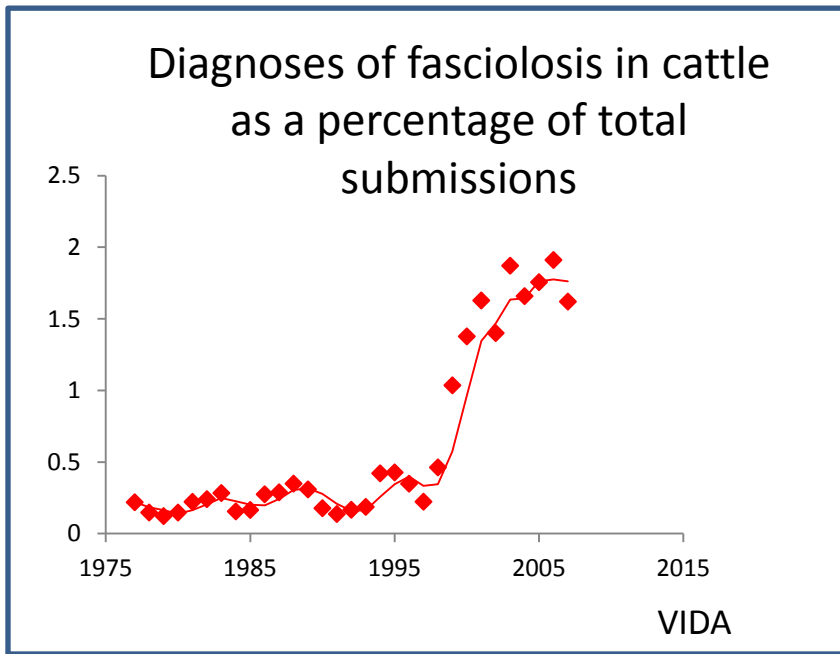
Factors affecting the life cycle of the liver fluke

- 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



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?

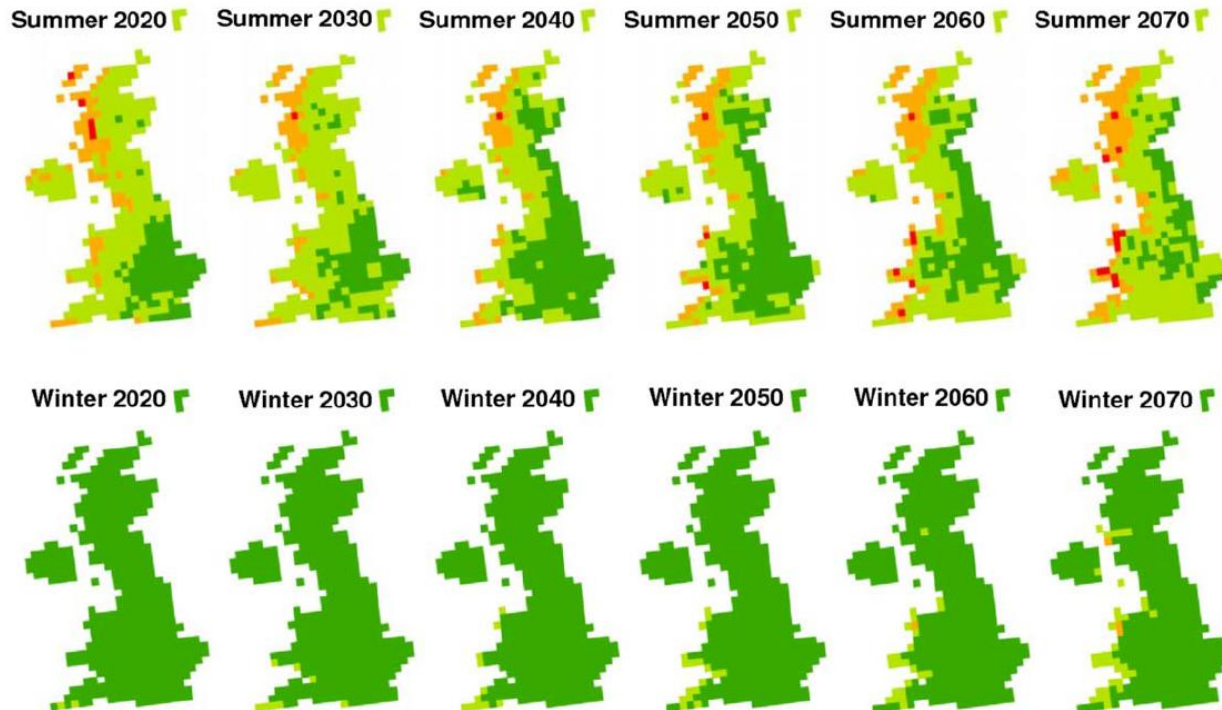
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Predicting Impacts of Climate Change on *Fasciola hepatica* Risk

Naomi J. Fox^{1,2,3}, Piran C. L. White², Colin J. McClean², Glenn Marion³, Andy Evans¹, Michael R. Hutchings^{1*}

¹ Animal Health, Scottish Agricultural College, Edinburgh, United Kingdom, ² Environment Department, University of York, York, United Kingdom, ³ Biomathematics and Statistics Scotland, Edinburgh, United Kingdom



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



A composite faecal egg count reduction test to detect resistance to triclabendazole in *Fasciola hepatica*

R. Daniel, J. van Dijk, T. Jenkins, A. Akca, R. Mearns, D. J. L. Williams

Veterinary Record (2012)

doi: 10.1136/vr.100588



FECRT using composite faecal samples

Farm	Pre-drenching faecal egg count	Post-drenching faecal egg count	Significant reduction in faecal egg count	Mean % reduction
2	335	116	-	65
5	1,681	563	-	66
6	6,545	9,502	-	0
7	3,099	5,547	-	0
8	46,389	29,161	-	37
22	455	182	-	60
25	9866	9890	-	0

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



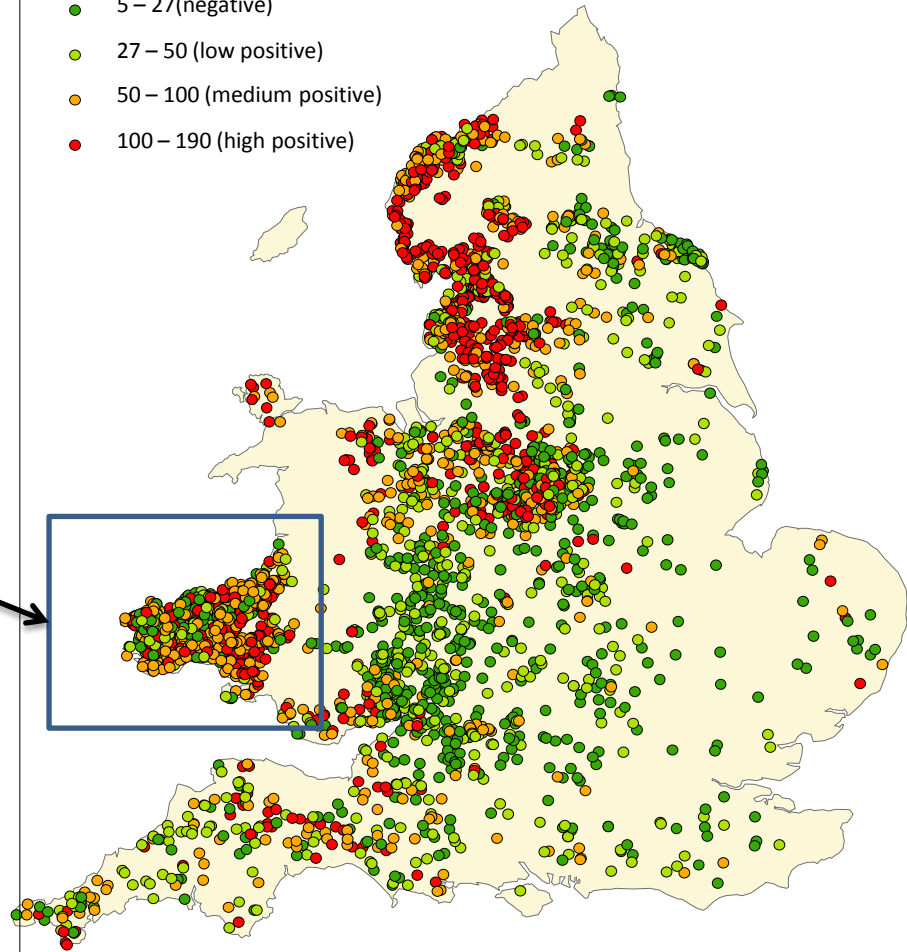
Models explain
about 78% of
variation between
post-code areas

Within one region,
same climate but
significant
differences between
neighbouring farms

Why?

Legend

- 5 – 27 (negative)
- 27 – 50 (low positive)
- 50 – 100 (medium positive)
- 100 – 190 (high positive)



Farm specific factors



- Presence of snail habitat and snails
- Drainage of pasture
- Month of turnout
- Stocking rates
- Type of watering area
- Presence of sheep



Geospatial Health 5(2), 2011, pp. 239-245

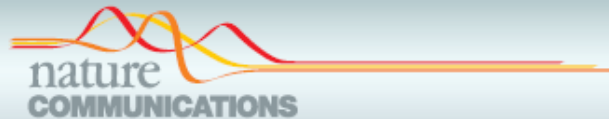
Towards assessing fine-scale indicators for the spatial transmission risk of *Fasciola hepatica* in cattle

Johannes Charlier¹, Sita Carolien Bennema¹, Yannick Caron², Michel Counotte¹, Els Ducheyne³, Guy Hendrickx³, Jozef Vercruysse¹

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Other impacts of fluke infection

The effect of fluke infection on diagnosis of bovine tuberculosis



ARTICLE

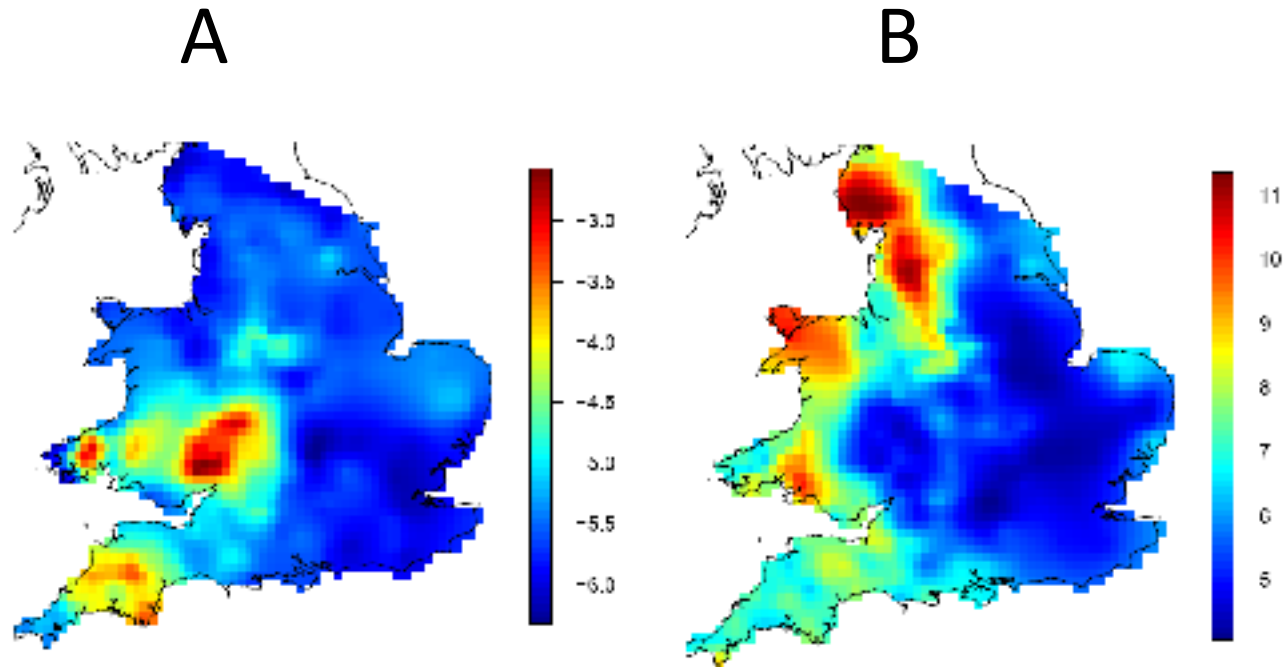
Received 18 Jan 2012 | Accepted 11 Apr 2012 | Published 22 May 2012

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

Jen Claridge¹, Peter Diggle^{1,2}, Catherine M. McCann^{1,†}, Grace Mulcahy³, Rob Flynn^{3,†}, Jim McNair⁴, Sam Strain⁴, Michael Welsh⁴, Matthew Baylis^{1,*} & Diana J.L. Williams^{1,*}

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 Paramphistome infection and *Fasciola hepatica*)
- Treatment of dairy cattle – oxclosanide
- Drug resistance
- Disease forecasting
- Stock and pasture management
- Vaccination
- Intra-breed innate resistance
- Susceptibility to and diagnosis of bTB and other infections

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