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Climate Change and Livestock Systems – Potential Implications for Animal Health

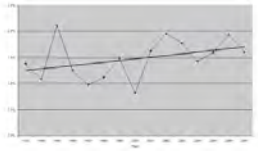
Introduction

The Scottish climate has changed significantly over the past ~30 years. Temperature has increased (average, max and min); average precipitation has increased, with some extreme events; the number of frost days has fallen and the grazing season has been extended by up to 4 weeks in all regions (data, SNIFFER report 2006). All available predictions indicate that our climate will continue to change and feature warmer summers and milder, wetter winters. These changes will favour the transmission of a number of key livestock pathogens and increase the risk of disease in our livestock. There has been much publicity surrounding the incursion of "exotic" diseases such as Bluetongue virus, but climate effects on endemic livestock disease have been largely ignored. Such diseases, exemplified by vector-borne and parasitic diseases, have the potential to be uniquely affected by climate as their causative agents possess larval stages, and in some cases, intermediate hosts, that are free-living in the environment.

Current trends

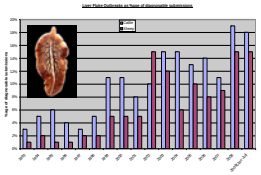
Baseline monitoring - we have used post-mortem surveillance data from Veterinary Investigation Diagnosis Analysis (VIDA) combined with clinical observations and case studies on farms to investigate the changing pattern of endemic disease in Scottish livestock. Some examples:

Vector-borne disease – there has been a significant increase in Louping Ill virus, a tick-borne encephalitis in sheep and red grouse as a result of increasing tick numbers. There has also been a concurrent increase in Lyme disease in humans (data Health Protection Scotland)



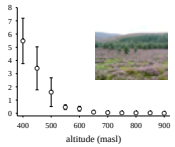
Incidence of Louping Ill virus in Scottish sheep (1993-2007)

Parasitic disease – the incidence of liver fluke disease (fasciolosis), which costs the Scottish livestock industry > £3m per year, has increased from 0.5-15% in sheep and from 3-19% in cattle since the mid-1990s. Also, the disease has spread from SW Scotland into traditionally fluke-free areas in the East and North-East.



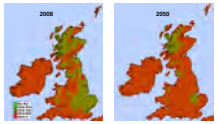
Future predictions

Computer modelling – climate effects on ticks – assuming climate warming is equivalent to moving downhill = increased tick numbers:



The statistical analysis took into account other variables such as host availability and vegetation type – the output is, therefore, likely to be a genuine climate effect

Climate matching – prevalence of the highly pathogenic roundworm, *Haemonchus contortus* - for UK risk, look to countries like New Zealand, which already have a significant problem:



Climate matching reveals an emerging problem in the UK likely to increase to New Zealand levels by ~2050

Policy implications

- A changing climate will cause changes in the patterns of endemic disease in our livestock
- Confounding factors, other than climate change, could help explain the observed trends. These include the emergence and spread of drug resistance and the large-scale movement of animals (and their pathogens)
- Livestock farmers can no longer rely on a blueprint for disease control in their animals - improved monitoring and surveillance are required to detect changing patterns of disease and to respond accordingly
- We need improved diagnosis, forecasting and effective vaccines to protect our livestock from this increasing threat of disease
- Healthy, productive, disease-free animals reduce wastage from the livestock sector, especially GHG emissions

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The Scottish Government

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