

## **POLICY BRIEF: USING SLAUGHTERHOUSE DATA AND CTS DATA TO IDENTIFY RISK FACTORS FOR LIVER FLUKE**

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### **1. KEY MESSAGE**

Using data on liver condemnation from abattoirs can be a powerful tool for identifying risk factors for liver fluke.

### **2. MAJOR FINDINGS**

- 22% of livers were condemned due to liver fluke damage.
- Liver fluke risk is greater in warmer and wetter areas, and older animals are more likely to be infected (15% of cattle <12 months old; >35% of cattle 30 months old).
- This corroborates previous studies and, importantly, demonstrates that this novel approach of using slaughterhouse data and CTS data is a robust and cost-effective way approach for identifying liver fluke risk factors.
- 55% of liver fluke risk was due to other factors not measured in the study, i.e. on-farm management. These factors likely include: access to wet areas (snail habitat), herd size, length of grazing season, flukicide application etc.
- There are implications for climate change: as Scotland is projected to become warmer and wetter, we may expect higher liver fluke risk in some areas. Further models are required for more detailed predictions.

### **3. OBJECTIVES**

This study aimed to:

- Explore a new, more cost-effective, approach to identifying the risk factors for liver fluke in cattle across Scotland, by combining data collected at abattoirs on liver condemnation, animal movement data from the Cattle Tracing Scheme and existing climate data.
- Identify the environmental risk factors for liver fluke in cattle across Scotland.
- Quantify the current contribution of environmental factors versus on-farm management to the risk of liver fluke.

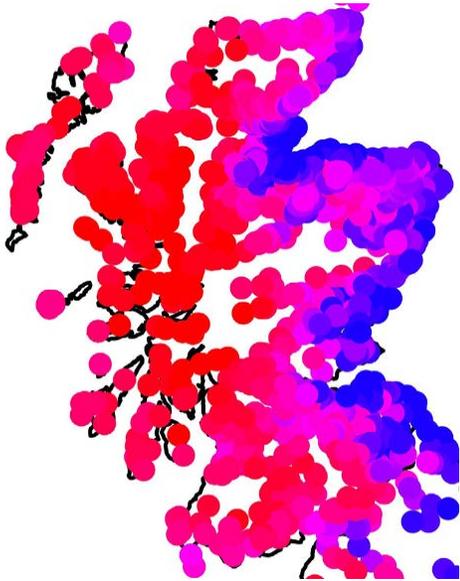
### **4. POLICY IMPLICATIONS**

- The study confirmed what previous studies have shown: that liver fluke risk is greater in warmer and wetter areas, and that older animals are more likely to be infected. This demonstrates that this novel approach of using slaughterhouse data and CTS data for identifying risk factors is robust and cost-effective.
- There are also implications for climate change: as Scotland is projected to become warmer and wetter, we may expect higher liver fluke risk in some areas. Further models are required for more detail on these predictions.

## 5. IMPORTANT ASSUMPTIONS AND LIMITATIONS

This study used novel statistical modelling techniques to combine data on >7,800 livers from the Dingwall abattoir (condemned or not condemned), animal movement data from the Cattle Tracing Scheme, and environmental data from a GIS database for the >2000 locations where animals had spent time. A first statistical step was to estimate the number of “risk days” (i.e. outside grazing during fluke season: April-September) that each animal spent at each location. This assumption is a source of error in the data, as cattle obviously vary in the periods of time spent outside. The data were challenging because the cattle spent different periods of time at different locations, each with different environmental characteristics. Therefore, we developed a variant of a generalized linear mixed model, that allowed us to model many factors as fixed and random effects, at both the individual animal and farm levels.

## 6. FIGURE



Model output of predicted liver fluke risk in cattle due to fixed effects (temperature, rainfall, northings and eastings). Redder is higher risk; bluer is lower risk.

## 7. LINKS TO EXISTING PUBLICATIONS OR REPORTS

Innocent, GT, Gilbert, L, Jones, EO, McLeod, JE, Gunn, G, McKendrick, IJ and Albon, SD. (2017) Combining slaughterhouse surveillance data with cattle tracing scheme and environmental data to identify environmental risk factors for liver fluke in cattle. *Frontiers in Veterinary Science* 4, 65. doi: 10.3389/fvets.2017.00065

## 8. POLICY COMMENTS/RESPONSE