

ANALYSIS OF RISK FACTORS USING LIFE HISTORY - A PARTIAL MEMBERSHIP
APPROACH TO ESTIMATING THE RISK OF LIVER FLUKE INFESTATION

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Where the whole life history of an individual is known, the overall risk of disease can be calculated by integrating the instantaneous risk over time. When risks are piecewise constant this simplifies to a sum of the products of the risks and its duration. We can invert this problem to infer the piecewise constant risks using a partial membership model, given a set of individual life histories with known disease status.

Using condemnation of cattle livers for the presence of liver fluke as an exemplar we infer the risk posed to an animal being present on each farm on which it stayed. By using INLA we are able to infer the relative risks associated with a number of fixed effects measured both at the animal and the farm level, and to infer random effects for farm: both a spatially smooth surface and for farm independent of its position.