Determinants of biosecurity behaviour of British cattle and sheep farmers—A behavioural economics analysis

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\section*{A B S T R A C T}

The paper analyses the impact of \textit{a priori} determinants of biosecurity behaviour of farmers in Great Britain. We use a dataset collected through a stratified telephone survey of 900 cattle and sheep farmers in Great Britain (400 in England and a further 250 in Wales and Scotland respectively) which took place between 25 March 2010 and 18 June 2010. The survey was stratified by farm type, farm size and region.

To test the influence of \textit{a priori} determinants on biosecurity behaviour we used a behavioural economics method, structural equation modelling (SEM) with observed and latent variables. SEM is a statistical technique for testing and estimating causal relationships amongst variables, some of which may be latent using a combination of statistical data and qualitative causal assumptions.

Thirteen latent variables were identified and extracted, expressing the behaviour and the underlying determining factors. The variables were: experience, economic factors, organic certification of farm, membership in a cattle/sheep health scheme, perceived usefulness of biosecurity information sources, knowledge about biosecurity measures, perceived importance of specific biosecurity strategies, perceived effect (on farm business in the past five years) of welfare/health regulation, perceived effect of severe outbreaks of animal diseases, attitudes towards livestock biosecurity, attitudes towards animal welfare, influence on decision to apply biosecurity measures and biosecurity behaviour.

The SEM model applied on the Great Britain sample has an adequate fit according to the measures of absolute, incremental and parsimonious fit. The results suggest that farmers’ perceived importance of specific biosecurity strategies, organic certification of farm, knowledge about biosecurity measures, attitudes towards animal welfare, perceived usefulness of biosecurity information sources, perceived effect on business during the past five years of severe outbreaks of animal diseases, membership in a cattle/sheep health scheme, attitudes towards livestock biosecurity, influence on decision to apply biosecurity measures, experience and economic factors are significantly influencing behaviour (overall explaining 64\% of the variance in behaviour).
1. Introduction

Despite strong evidence of considerable public and private net benefits from investment in biosecurity at farm level, uptake and implementation on UK cattle and sheep farms remains poor. Previous work has shown such farmers to be generally dismissive of biosecurity actions and focused more on attribution for the disease threats themselves. This has serious implications for policy. Understanding which determinants influence farmers’ behaviour would assist policy makers to achieve behavioural change.

Biosecurity is an integral part, as well as legal requirement, of livestock production. There is a large number of biosecurity and animal health measures that can be taken along the supply chain from producers to processors, however farmers are the ones who are generally considered to be the first line of defence in disease mitigation (Burrell, 2002; Palmer et al., 2009). Farmers are provided with information, advice and regulations to learn and follow, however not all of them have the same attitudes and/or behaviour towards biosecurity due to heterogeneous factors which affect their decision-making (Fairweather and Keating, 1994; Wasson, 1973; Maybery et al., 2005; Gunn et al., 2008; Heffernan et al., 2008). These factors do not necessarily relate to business/profit aspects (Brodt et al., 2006; Garforth and Rehman, 2005; Wasson, 1973; Wasson and Errington, 1993; Maybery et al., 2005; Gunn et al., 2008; Heffernan et al., 2008).

The literature on farmer behaviour and decision-making has shown that there is a number of factors that potentially influence the decision-making process and hence farmer’s behaviour, such as farm’s physical and economic constraints, farmer’s socio-demographics and their access to the information available, which will influence their understanding of the issues and the consequences of implementing or not biosecurity measures.

The physical attributes of the farm will largely determine what biosecurity measures are required and the level of investment (be it financial or labour) needed. Farmers perceive the level of investment required to implement many biosecurity measures to be costly. Either requiring an increase in management effort with a higher demand on labour and time (Dwyer et al., 2007; Gunn et al., 2008; Hubbard et al., 2007; Morgan-Davies et al., 2006) or requiring changes to the system, such as building improvements or maintenance of boundaries (Bewell and Monaghan, 2007; Brennan et al., 2008). As well as the farm’s physical constraints, the financial situation of the enterprise will impact on what measures the enterprise can afford to implement (Chilonda and Van Huyltenbroeck, 2001; Stott et al., 2003; Tuyttens et al., 2007).

Three other models were run for the individual regions (England, Scotland and Wales). A smaller number of variables were included in each model to account for the smaller sample sizes. Results show lower but still high levels of variance explained for the individual models (about 40% for each country). The individual models’ results are consistent with those of the total sample model. The results might suggest that ways to achieve behavioural change could include ensuring increased access of farmers to biosecurity information and advice sources.

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