‘Only Bad Farmers Suffer from Livestock Disease’

An exploration of the drivers to collective bio-security behaviour among UK cattle and sheep farmers.
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Scope of Work

The Livestock Development Group was contracted by the DEFRA-funded project: CTO301 *An Integrated Approach to Bio-security on UK Cattle and Sheep Farmers: Evaluating existing measures for endemic diseases against exotic threats* to undertake an analysis of farmer-led bio-security initiatives and the attitudes and values underpinning collective behaviour. Therefore, the aim of the study was to identify the drivers to successful individual and group behaviour in order to foster improved national, local and on-farm bio-security with regard to endemic and exotic livestock disease threats.

A further output was the creation of a video to illustrate stakeholder attitudes and perceptions toward bio-security. The aim of the film was to explore potential issues in forging collective behaviour towards bio-security, at the community level.
Executive Summary

At present, collective behaviour regarding bio-security among UK cattle and sheep farmers is rare (Hovi et al., 2006). Despite the occurrence of catastrophic livestock diseases such as BSE and FMD, within the past 20 years, there are few national or local farmer-led animal health schemes. Therefore, to explore the reasons for this apparent lack of interest in bio-security at the community-level, the research utilised a socio-psychological approach to disaggregate the cognitive, emotive and contextual factors driving bio-security behaviour among UK cattle and sheep farmers. In total, the study interviewed 127 farmers in Devon, Cornwall and Wales.

A cohort of 58 participants representing members/non-members of specific animal health schemes formed part of the study set. As such, the original intention of the research was to explore the differing perceptions and attitudes of group vs. non group members. However, the early analysis revealed that key drivers to bio-security included perceptions of the future of farming and equally importantly, the attribution or blame for past disease epidemics. Thus, during the course of the study the emphasis shifted from group membership to exploring the complexities of the relationship between these factors, as the drivers of collective behaviour.

Collective behaviour is believed, by psychologists, to be the outcome of participants ‘collective definition’ of a situation, rather than simply a response to objective conditions (Blumer, 1971). Therefore, the study first, identified those attitudes comprising the ‘collective definition’ of bio-security, among participants. Further, psychological theory disaggregates attitudes into three components: cognitive, affective (feeling) and behavioural (action) (Breckler and Wiggins, 1989; Eagley and Chaiken, 1993). These factors, however, co-exist within a shared environment. As such, in the second portion of the study, the components of attitudes toward bio-security were explicaded within the wider context of information flows and social connectivity in the communities involved.

Analytical tools included a content and cluster analysis. The two approaches were synergistic. Indeed, while the content analysis was utilised to explicate the drivers forging attitudes toward collective behaviour found within farmer narratives, the cluster analysis was utilised to identify the relationships within and between these factors.

The results of the content analysis illustrated the high levels of ‘cognitive dissonance’ among participants in relation to bio-security.¹ Despite the wide-scale impacts of livestock disease on the industry, most study participants were dismissive of the many

¹ Cognitive dissonance occurs when the relationship between attitudes and behaviours is ‘inconsistent’ (Festinger, 1957). In order to reduce such dissonance, people often respond by changing their attitudes (Aronson, 1988).
measures associated with bio-security. Justification for this lack of interest was largely framed in relation to the collective attribution or blame for the disease threats themselves. Indeed, epidemic diseases were largely related to external actors and agents and reasons for outbreaks included inadequate border control, in tandem with ineffective policies and regulations. At the individual farm-level, endemic livestock disease was viewed as a problem for ‘poor’ farmers and not an issue for those farmers, who managed their stock well. Thus, much of the apparent dissonance could be explained by the wider social context relating to animal health. Indeed, ‘good farmers’ had little need to worry about livestock disease. As such, there was little utility in forming groups to address, what is largely perceived as an individual problem.

Nevertheless, the cluster analysis illustrated that perceptions regarding the future of farming had the strongest relationship to attitudes toward, and the subsequent adoption of bio-security measures and behaviours. Indeed, those farmers with a positive view of the future tended to believe that collective action with regard to bio-security, at the community level, was both feasible and desirable. Equally, the study demonstrated that farmers with a positive view of the future tended to receive information from different sources and implemented different bio-security measures than those espousing negative views. Interestingly however, social networks for the transfer of bio-security related information were strongest among those individuals with negative views of the future of farming. Thus, those participants eschewing collective behaviour regarding bio-security were actually engaging in such behaviour informally.

The study concluded that in order to support the uptake of collective action with regard to bio-security, messages need to be reframed and delivered from a neutral source. Further, efforts to support group formation must recognise and address the issues relating to perceptions of social connectedness among the communities involved. Indeed, many farmers believe that they have little in common with their neighbours due to differing production or operational goals. Finally, a better understanding of the strength and frequency of knowledge networks at the community level is required.
1. Introduction

In recent decades, animal health has become of global public interest (Fidler, 2004). Indeed, epidemic diseases such as Foot and Mouth Disease and Avian Influenza have captured high levels of media and public attention. With this attention, farming communities, practices and government responses have come under increasing scrutiny. However, the responsibility for prevention and control of endemic diseases lies largely at the farm level. Collective action to control these diseases is rare. Thus, while traditionally governments are accountable for trans-boundary diseases such as FMD; endemic diseases have largely been the responsibility of the farmers involved.

Nevertheless, in recent years, UK government policy regarding animal health has shifted (DEFRA, 2005). It may be argued that the enhanced media and public awareness of livestock disease has been one the drivers of change. Indeed, the Animal Health and Welfare Strategy of Great Britain, places farmers in the forefront regarding livestock disease prevention and control (DEFRA, 2004). Economic drivers are cited as the basis for this shift. Indeed, the new strategy is overtly based on the principle that taxpayers should only pay for genuine public goods (DEFRA, 2006). Therefore, with regard to livestock disease, farmers are best placed to manage risks but also benefit the most from disease control (ibid). However, EU regulations are also changing with regard to animal health. CAP reform and efforts to enhance the safety of the food chain are also likely influences on UK government policy. Further many EU nations have set about eradicating diseases that are still endemic in the UK. Thus, it is clear that animal health policy is shaped by a variety of exogenous ‘demands’ on policy makers such as public interest, economic and political pressures. It is further clear that these demands are intricately intertwined creating, at specific time periods, the critical mass required to drive change.

However, a study performed by The University of Reading and SAC (2004) observed that very little internal cohesion and collaborative effort/spirit existed between and within the stakeholders responsible for farm-level bio-security in the UK. Therefore, collective decision-making within the field of animal health may also be informed by notions of attribution or responsibility ascribed to particular actors. For example, attitudes toward pan-European BVD eradication and control by decision-makers were highly dependent upon the level of blame for the disease apportioned to farmers (Heffernan et al. 2005). Equally important was perceptions regarding administrative competence and the ability of certain countries to enforce the necessary regulations to underpin successful collaborative action (ibid).

Indeed, with the exception of Shetland (Synge et al. 1999) and a few other local initiatives (Highlands & Islands Sheep Health Association), cattle and sheep farmers in the UK have shown little interest in health schemes and associated disease prevention strategies. Even those directly impacted chose to disregard bio-security lessons learnt after the foot-and-mouth crisis of 2001 (Paterson et al. 2003).

For example, Sweden has eradicated bovine virus diarrhoea virus (BVDV), infectious bovine rhinotracheitis (IBR) virus and enzootic bovine leucosis (EBL) (Swedish National Veterinary Institute, 2005) and has further prevented the introduction of paratuberculosis.
From a socio-psychological perspective, collective behaviour is the outcome of participants ‘collective definition’ of a situation. Indeed, according to psychologists, attitudes are comprised of three components: first, a set of shared cognitive beliefs, second, emotional factors and finally, the predominant motivation and/or behaviour of those present (Beckler and Wiggins, 1989; Eagley and Chaiken, 1993). These drivers, however, co-exist within a shared context or reality (ibid). In this case, the information available to farmers regarding bio-security and the viability of networks by which information or knowledge may be transferred.

However, Granovetter (1978) further argued that collective behaviour may be ‘paradoxical’ or inconsistent with the intentions of the individuals which generate them. For example, while farmers may believe that industry-regulation with regard to bio-security measures are better than government driven processes, they still may be reluctant to join a group to address these issues. Therefore, one needs to consider how individual preferences interact and aggregate. Indeed, the author describes the effects of ‘social structure’ (friendship and influence) on collective behaviour. Hence, in many cases, the assumption of ‘complete connectedness’ between group members is inappropriate or ‘that each individual is responsive to the behaviour of all others (ibid).

Therefore, the study utilised the above factors to explore collective behaviour regarding bio-security behaviours among UK cattle and dairy farmers. As such, the research explored three areas: first the shared beliefs regarding bio-security measures and threats among a subset of UK cattle and sheep farmers. Second, the study identified the emotive factors that may be influencing behaviours in this regard. Finally, the predominant motivational forces for being part of a group to deal with collective bio-security were identified. The research considered farmers who were both part of, and external to, bio-security schemes.

The analytical framework underpinning the study is described below.

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4 Cognitive belief is the combination of ‘facts’ that are commonly defined as being real and relevant.
5 Emotional factors are the affective elements of a situation e.g., dominant emotions evoked.
6 Granovetter (1978) describes ‘threshold models’ which he argues ‘may be of particular value in understanding situations where the average level of preferences clearly runs strongly in favour of some action but the action is not taken.’ Threshold models explain situations whereby individuals have different thresholds for action. For example, farmers may join a scheme when the benefits of collective action outweigh the individual costs. However, joining a scheme may be influenced by the number of other farmers in the group. Individual farmers may have different ‘thresholds’ for the number of other farmers needed to join, before they will themselves join. Within this example, even when the majority feel that a scheme would lead to collective benefits, they will not act collectively as the benefits to joining do not outweigh the costs, without more people having joined first. The example demonstrates paradoxical group behaviour in comparison to individual values.
2. The Analytical Framework

As detailed above, the study disaggregated three factors in relation to group behaviour. However, the overall analysis was framed within the social and informational context which the participating farmers were operating in.
Figure 1. The Analytical Approach

- Collective behaviour
- Collective definition of a situation
- Livelihood Expectations i.e. Views of the Future
- Social Connectivity and Information Networks
- Shared Cognitive beliefs
- Emotional factors
- Predominant motivation
- Views on Bio-Security
- Attitudes toward Actors and Agents
- Farmer perceptions regarding self-regulation and incentives required.
- Constraints to Farming
- Worries regarding disease outbreaks.
3. Materials and Methods

3.1 Data Collection:

In total, 115 farmers participated in the study from three geographic regions: Wales, Cornwall and Devon. The breakdown of participating individuals is as follows:

Table 1 Study Participants by Geographic Area

<table>
<thead>
<tr>
<th>County</th>
<th>No of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornwall</td>
<td>34</td>
</tr>
<tr>
<td>Devon</td>
<td>37</td>
</tr>
<tr>
<td>Gwynedd</td>
<td>34</td>
</tr>
<tr>
<td>Powys</td>
<td>10</td>
</tr>
</tbody>
</table>

Five schemes were contacted for inclusion for the study:

- Duchy of Cornwall: Vocational Training Scheme
- Welsh Black Society
- National Scrapie Eradication Programme
- Orkney Hi Health
- Mignairn Grazier’s Association

Positive responses were received from three schemes: Duchy of Cornwall, the Mignairn Graziers Association and the Orkney Hi Health Scheme. Nevertheless, in subsequent follow-up, Mignairn Grazier Association members did not wish to participate in the study. Further, conflicts in scheduling prevented the participation of the Orkney Hi Health farmers. As such, the study included participants from the Duchy of Cornwall Vocational Training Scheme (VTS) and the National Scrapie Eradication Programme. Among these schemes, a cohort of 58 farmers representing those both in/outside the groups was identified.

Further, the study team was asked to follow-up former focus-group participants from the study OZ0144: Constraints to uptake of adequate bio-security on UK cattle and sheep farms with special reference to zoonotic disease. Postal interviews were sent to 44 participants from the previous study. In total, 12 responses were received from this group which were included in the wider data set.

Open-ended, semi-structured interviews were performed in which study participants were asked the following core questions:

1. What is your view regarding the future of farming for the next generation?
2. Which bio-security measures, in your opinion, is most desirable?
3. Which bio-security measures do you find least useful/desirable?
APPENDIX 8

4. Do you think bio-security regulations should be all voluntary, mainly voluntary, all compulsory or mainly compulsory?
5. What are the main constraints to your farming operation?
6. What are the main livestock disease constraints that you face?
7. Are you worried about another livestock disease epidemic?
8. Can farmers groups be an effective force in bio-security?
9. What is your primary source of information regarding bio-security?

3.2 Data Analysis

The data was analysed utilising two different approaches. First, the narratives produced by study participants were analysed utilising the Atlas Ti software programme. Responses were coded and a content analysis performed to explore the intention and frequency of the cognitive, emotional and motivational factors important to the adoption of bio-security measures.

Second, a ‘joining’ or ‘tree clustering’ algorithm was used to explore the commonalities between farmers with regard to bio-security attitudes and behaviour. As such, the cluster analysis was utilised to explore the strength of participant associations with the different variables under study. Further, given the categorical nature of the data, a chi-square measure was used to calculate the significance of the distance between clusters. The results are presented in the form of ‘Horizontal Hierarchical Tree Plots’ (or Dendrograms).

4. Results

The results are presented in two parts. First, the findings of the content analysis are offered. Second, the results from the cluster analysis are detailed.

PART I: The Content Analysis

4.1 Views of the Future

Overall, the vast majority of farmers expressed concerns over the future of farming and the ability of the next generation to farm as currently practiced. Indeed, 77% of participating farmers viewed the future as being uncertain or negative. While only a minority of those participating offered a positive response, most of the positive responses related to perceptions regarding the potential of arable farming due to the increased demand for bio-fuels. Nevertheless, the future of livestock farming was considered less favourable than crop production.
Table 2: Perceptions Regarding the Future of Farming

<table>
<thead>
<tr>
<th>The Future of Farming</th>
<th>Percentage of Responses (n=166)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Family/Small Farms</td>
<td>27%</td>
</tr>
<tr>
<td>Economically Unviable</td>
<td>19%</td>
</tr>
<tr>
<td>Environmental Management/Conservation</td>
<td>5%</td>
</tr>
<tr>
<td>Difficult/Struggle</td>
<td>11%</td>
</tr>
<tr>
<td>Good/Positive</td>
<td>11%</td>
</tr>
<tr>
<td>Children Move out of Farming</td>
<td>12%</td>
</tr>
<tr>
<td>More Bureaucracy</td>
<td>3%</td>
</tr>
<tr>
<td>Less Livestock Farming</td>
<td>3%</td>
</tr>
<tr>
<td>Lack of Gov Support/Subsidies</td>
<td>8%</td>
</tr>
</tbody>
</table>

As the table illustrates, there was an overall notion that the future of farming will belong to bigger producers with the family farmer becoming an anachronism. Those farmers with sons tended to be more positive regarding the future of farming than those with daughters, due to customary lines of inheritance. Many of the older participants expressed concern about having to leave the land with no children to carry on with farming.

4.2 Bio-Security Measures

When asked which bio-security measure was most desirable the vast majority of participants cited ‘none’ as the following table illustrates.

Table 3: Most Desirable Bio-Security Measure

<table>
<thead>
<tr>
<th>Bio-security Measure</th>
<th>Proportion of respondents (n=106)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>58%</td>
</tr>
<tr>
<td>Cull/Control Badgers</td>
<td>13%</td>
</tr>
<tr>
<td>Improved Fencing/Hedges/Stonewalls</td>
<td>9%</td>
</tr>
<tr>
<td>New/Better Buildings</td>
<td>11%</td>
</tr>
<tr>
<td>Vaccination</td>
<td>5%</td>
</tr>
<tr>
<td>Washing Bay</td>
<td>3%</td>
</tr>
</tbody>
</table>

Conversely, 72% of participants cited the least useful/desirable bio-security measures were those implemented during/in response to, the FMD epidemic of 2001.
Table 4: Least Desirable Bio-Security Measure

<table>
<thead>
<tr>
<th>Bio-security Measure</th>
<th>Proportion of respondents (n=85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMD Regulations</td>
<td>46%</td>
</tr>
<tr>
<td>Movement Restrictions</td>
<td>26%</td>
</tr>
<tr>
<td>Pre-movement TB Testing</td>
<td>9%</td>
</tr>
<tr>
<td>Regulations on Disinfectant</td>
<td>5%</td>
</tr>
<tr>
<td>Scrapie Scheme</td>
<td>4%</td>
</tr>
<tr>
<td>Pesticide Bans</td>
<td>4%</td>
</tr>
<tr>
<td>Import Control Strategy</td>
<td>4%</td>
</tr>
</tbody>
</table>

Indeed, for many respondents, bio-security was viewed as the measures implemented by the government directly in relation to FMD. Thus, there was little understanding of bio-security measures being utilised as a means of control of wider endemic and exotic disease threats.

4.2.1 Attitudes toward Bio-security Regulations

Interestingly, 78% of those farmers interviewed believed that regulations regarding bio-security should be all/mostly compulsory.

Table 5: Attitudes toward Bio-security Regulations

<table>
<thead>
<tr>
<th>Bio-security Regulation</th>
<th>Proportion of respondents (n=118)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Compulsory</td>
<td>57%</td>
</tr>
<tr>
<td>Mostly Compulsory</td>
<td>22%</td>
</tr>
<tr>
<td>Mostly Voluntary</td>
<td>14%</td>
</tr>
<tr>
<td>All Voluntary</td>
<td>8%</td>
</tr>
</tbody>
</table>

Reasons for the compulsory nature of regulations tended to focus on an overall lack of trust as the following responses demonstrate:

‘If one does it everyone has to do it. Should be compulsory, there's no point in one doing it and others don’t.’ (ID23)

‘Better that everyone has to comply to make sure that all are doing it’ (ID34)

‘There is just one to ruin it for the rest’ (ID47)

‘You will have rogues who will take advantage of the situation’ (ID66)

Nevertheless, while farmers desired compulsory regulation, the role of the government in enforcing such regulations was questioned.
Table 6. Attitudes toward the Government

<table>
<thead>
<tr>
<th>Perceptions of Government</th>
<th>Proportion of respondents (n=88)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Understanding of Farming</td>
<td>24%</td>
</tr>
<tr>
<td>Should/Must Intervene</td>
<td>25%</td>
</tr>
<tr>
<td>Too Much Interference</td>
<td>32%</td>
</tr>
<tr>
<td>Misguided/Damaging Interventions</td>
<td>14%</td>
</tr>
<tr>
<td>Poor Border Regulation</td>
<td>6%</td>
</tr>
</tbody>
</table>

Overall, nearly 75% of study participants offered a negative view of the government ranging from a lack of understanding of farming to too much interference (principally in the form of paperwork) to misguided and/or ineffective interventions.

Therefore, while there was a perception that the government was required to ‘police’ bio-security regulations there was a strong bias against government action in this area.

4.3 Constraints to Farming

Indeed, when asked to detail the main constraints to their farming operation, increased government regulation/paperwork accounted for over 60% of responses as the following table illustrates.

Table 7 Main Constraints to Farming

<table>
<thead>
<tr>
<th>Constraints to Farming</th>
<th>Proportion of respondents (n=80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Regulations/Attitudes</td>
<td>29%</td>
</tr>
<tr>
<td>Paperwork</td>
<td>31%</td>
</tr>
<tr>
<td>High Cost of Production</td>
<td>29%</td>
</tr>
<tr>
<td>Lack of Time</td>
<td>11%</td>
</tr>
</tbody>
</table>

Thus, the attribution or blame for poor performance in the farming sector is being squarely laid at the government’s door with bureaucracy viewed as a main constraint by the farmers themselves.

Overall, the responses are revealing on a number of levels. First, by outlining the lack of trust between community members, it may be argued that the responses illustrate a lack of ‘social connectedness’ within this particular group. Secondly, it is clear that attitudes toward the government in relation to bio-security are conflicted. While farmers recognise the need for compulsory regulations, there is a general level of mistrust in the intentions of the institution expected to perform this task. However, while the government was viewed as a key constraint to farming, such a conclusion oversimplifies the relationship between the farming industry and the government as the following response demonstrates:
‘If government are saying something should be done then it should be paid for by the government but if the government are not paying for it they should keep out.’

Thus, the government was viewed as an acceptable partner when financial incentives were involved but was largely resented when this was not the case. Nevertheless, it is clear that while financial incentives might improve compliance in the short-term, there is little underlying support for many of the measures themselves. Therefore, the impact on any form of subsidy on bio-security behaviour change, over time, is likely to be limited.

4.3.1 Livestock Disease Constraints

Study participants were next asked to rank their primary livestock disease constraint. Not surprisingly, TB was the primary concern of farmers in the Southwest and foot rot a key problem for sheep farmers in Wales. Interestingly, however, there was a high level of consistency across the rankings as the following figure illustrates.

**Figure 2: Rank of Livestock Disease Constraints**

![Bar graph showing the rank of livestock disease constraints]

Indeed, within the second rank, only BVD and intestinal parasites entered the rankings at a higher level. Equally, no new diseases entered the second order ranking. The finding illustrates that farmers have a high level of consistency in their collective
definition of the importance of different livestock diseases and understanding this ‘consistency’ could be important in developing effective bio-security messaging.

When asked if they were afraid of another livestock disease epidemic occurring, over $\frac{1}{2}$ of the study group expressed concern as the following table illustrates.
Table 8: Are you worried about another livestock disease epidemic?

<table>
<thead>
<tr>
<th>Response</th>
<th>Proportion of respondents (n=127)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>59%</td>
</tr>
<tr>
<td>No</td>
<td>35%</td>
</tr>
<tr>
<td>No Response</td>
<td>6%</td>
</tr>
</tbody>
</table>

Further, 80% of the positive responses were in relation to the reoccurrence of FMD, with the remainder expressing concern regarding the spread of TB. Only 4% of farmers cited worry over an outbreak of Avian Influenza.

Thus, not surprisingly FMD remains in the forefront of collective memories and further appears to define past and present disease control efforts. When asked to explain their responses, the following reasons were detailed.

Table 9: Reasons Offered

<table>
<thead>
<tr>
<th>Response</th>
<th>Proportion of Respondents (n=81)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Ineffective Import/Border Regulations</td>
<td>43%</td>
</tr>
<tr>
<td>Prior Epidemic Handled Badly</td>
<td>16%</td>
</tr>
<tr>
<td>Cost/Lack of Compensation</td>
<td>7%</td>
</tr>
<tr>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Better Prepared</td>
<td>7%</td>
</tr>
<tr>
<td>Can't Prevent</td>
<td>14%</td>
</tr>
<tr>
<td>Same Won’t Happen Again</td>
<td>5%</td>
</tr>
</tbody>
</table>

From the responses, both negative and positive the attribution or blame for the epidemic lies with an external body in this case the government. Indeed, the majority of responses cited the lack of effective import regulations allowing exotic diseases into the country. Equally, 16% of the study group believed the last epidemic was ‘handled badly’ putting the farming community at risk. Further, some participants expressed the opinion that the prior epidemic was politically manufactured to damage rural communities. Only 7% of the overall study group offered the notion that the community and/or government would be better prepared in another disease outbreak situation.

Hence, the responsibility for the introduction of an epidemic livestock disease and equally importantly the manner in which it was dealt with is not perceived as being within the control of the farmers themselves. Therefore, logically bio-security is an externally imposed solution to a problem derived from others.

4.4 Group Behaviour and Bio-Security

As such, when asked if farmers themselves could form groups to enhance bio-security, not surprisingly the responses were largely negative as the following table illustrates.
Table 10: Can Farmer’s Groups Implement Bio-security Regulations?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent Response (n=127)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>52.0%</td>
</tr>
<tr>
<td>Yes</td>
<td>36.2%</td>
</tr>
<tr>
<td>No Response</td>
<td>11.8%</td>
</tr>
</tbody>
</table>

Nevertheless, when asked to explain their reasoning, rather than focus on the government, the majority of negative reasons focused on the inability of farmers to work together.

Table 11: Reasons Offered

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percent Response (n=71)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could Work</td>
<td>41%</td>
</tr>
<tr>
<td>Lack of Will/Consensus</td>
<td>30%</td>
</tr>
<tr>
<td>No Financial Incentive</td>
<td>11%</td>
</tr>
<tr>
<td>Farmers too Independent</td>
<td>31%</td>
</tr>
<tr>
<td>Lack of Trust/Rogue Farmers</td>
<td>15%</td>
</tr>
<tr>
<td>Government Should Regulate</td>
<td>14%</td>
</tr>
</tbody>
</table>

As the table illustrates, 46% of participants thought that the personal characteristics of farmers would prevent any meaningful outcome of groups formed to enhance bio-security. While 41% of responses were ostensibly positive and participants noted that such schemes ‘could work’, these responses were generally qualified with the lack of financial incentive and the lack of will being offered to illustrate that such schemes were, in reality, ‘unlikely to work’.

Therefore, the lack of social cohesion among community members was identified as a problem in facing common threats. Nevertheless, as will be discussed in the following section, when the sources of information regarding bio-security were explored, a different picture emerged with regard to social networks and knowledge transfer.

However, the study found an additional factor impacting group cohesion and collective action with regard to bio-security. Indeed, social perceptions regarding the attribution or blame for endemic disease threats lay with the individual farmer. Indeed, ‘good’ farmers were careful managers and therefore did not suffer from livestock diseases as the following excerpts demonstrate:

‘Livestock health is an ongoing thing constant management reduces risk and deals with problems quickly.’ (ID 27)
‘The trick is to keep on top of all of the diseases - the ability of spotting it is all [down to] good management practises. (ID 28)

‘Proper management and injections…mean that animals kept in a well state and a close eye kept upon them. (ID 40)

We always get a little of this and that but we keep a good eye all of the animals - good management is important (ID 45)

‘Only bad farmers suffer from diseases’ (ID 36)

Thus, if the attribution or blame for endemic livestock disease lies with the individual farmer, it is likely that groups will be viewed as an instrument of increased social pressures and possibly derision for those individuals perceived as ‘having a problem’.

4.5 Information Sources for Bio-Security

Overall, the primary sources of information for farmers on bio-security are as follows.

Table 12: Primary Sources of Information

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Percent Response (n=127)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed Society</td>
<td>2%</td>
</tr>
<tr>
<td>Farmer's Media</td>
<td>17%</td>
</tr>
<tr>
<td>Radio/Internet/Library</td>
<td>2%</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>8%</td>
</tr>
<tr>
<td>Veterinary Surgeon</td>
<td>55%</td>
</tr>
<tr>
<td>DEFRA</td>
<td>9%</td>
</tr>
<tr>
<td>Local Council</td>
<td>1%</td>
</tr>
<tr>
<td>Sales Rep</td>
<td>3%</td>
</tr>
<tr>
<td>Local College</td>
<td>1%</td>
</tr>
<tr>
<td>Own Experience</td>
<td>1%</td>
</tr>
</tbody>
</table>

As the table illustrates, information sources were highly polarised between local vets and the farmer’s media such as the Farmers Weekly and other national industry magazines. However, in relation to the usefulness of material on offer, the government as a source of information was largely perceived in a negative light:

‘DEFRA booklets and leaflets you never read them you throw them away twice a month.’ (ID10)

‘DEFRA is misleading you and are not informed and repeat the information.’ (ID11)

‘DEFRA leaflets are used to light the fire.”(ID13)
‘When you ring DEFRA about something they don't know the answers.’ (ID28)

The results further confirm the widely held belief regarding DEFRA as a key contributor to animal health issues and problems. The finding will be further discussed in section 6.

Interestingly, 8% of farmers noted that they had received information from other farmers regarding disease control. Thus, there was some form of social networking regarding bio-security.

However, when asked to detail how often these sources of information were consulted, the following was found.

**Table 13: Reported Frequency of Use**

<table>
<thead>
<tr>
<th>Source</th>
<th>When Needed/Occasionally</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>2-4 Months</th>
<th>6 Months</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vet</td>
<td>36</td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Farmers</td>
<td>5</td>
<td>2</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FU</td>
<td>1</td>
<td>4</td>
<td>7</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Producers Association</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contracting Companies</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newspapers</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEFRA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmers Media</td>
<td>2</td>
<td>16</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio/Television</td>
<td>7</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local College</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welsh Assembly</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although the local vet was cited by a majority of farmers as the primary source of information regarding bio-security, the contact levels for most of the farmers, who participated in the study, were low. Indeed, the majority of farmers utilised their vets on an ‘as needed’ or occasional basis. The farmers media i.e. the Farmer’s Weekly and Farmer’s Guardian, not surprisingly had much higher contact levels on a weekly and monthly basis. Interestingly, contact with other farmers also mainly occurred on a weekly basis. Finally, reports of contact with DEFRA varied dramatically with intervals ranging from daily to 6-monthly.

Thus, it is clear that while farmers themselves believe that group consensus regarding bio-security would be hard to achieve, participants did identify social networks in which
livestock disease related knowledge was transferred. Hence, the lack of social connectedness appears to extend only to group agreement and is less problematic with regard to knowledge pathways.
4.6 Summary of Content Analysis

The content analysis identified many of the ‘paradoxes’ that Granovetter (1978) noted with regard to collective behaviour. For example, bio-security measures were largely viewed as an externally imposed solution to an externally imposed problem (FMD). Nevertheless, farmers were reluctant to take responsibility for bio-security themselves and thereby regain ‘control’ over this issue. Indeed, the majority of study participants desired compulsory disease control regulations. Surprisingly, constraints to collective action with regard to bio-security did not revolve around the government, but rather were directly linked by participants to a lack of trust within the farming community itself.

Equally, while the lack of social trust and cohesion was sited as a key problem in the potential effectiveness of community-level bio-security schemes, information regarding disease control was being transferred via the social networks of some study participants.

This apparent ‘dissonance’ between attitudes and behaviour may be related to the overall perception of farmers regarding livestock disease in which ‘good’ farmers keep a watchful eye and therefore, do not suffer from livestock disease. Within this paradigm, by necessity, disease threats must have external origins with other actors and agents to blame. Collective behaviour, would, on some level, be an admission of a problem that ‘good’ farmers should have little to worry about. Indeed, when asked to detail the overall constraints to farming, animal health was rarely mentioned as a problem among a community that has been impacted by two catastrophic livestock disease epidemics with the past twenty years: BSE and FMD with TB on the ascendance.

Thus, the social pressures involved support the need for an external party in which the attribution or blame for subsequent failures with regard to bio-security can be placed. As such, negative reactions toward the government both remove individual responsibility and further justify existing beliefs. The notion may help explain the unlikely support for compulsory regulation in the face of what psychologists would claim are strongly held collective beliefs regarding the reasons for bio-security lapses and for the overall demise of farming, as currently practiced.
Figure 3 Content Analysis Results

**APPENDIX 8**

**Future of Farming**
- Fewer Family Farms
- Economic Hardship
- Children’s Livelihoods Off-Farm

**Sources of Information**
- Vets, Farmer’s Media, Other Farmers
- Vets Occasional/As Needed

**Positive: Biofuels, Arable Farming**

**Most Desirable Bio-Security Measures**
- None

**Least Useful Bio-Security Measures**
- FMD Regulations

**FMD Cause Ineffective Border Control**

**Bio-security Regulations**
- All/Mostly Compulsory

**Attitudes towards the Government**
- Too much Interference Damaging Interventions

**Should/Must Intervene**

**Constraints to Farming**
- Regulations/Paperwork

**Constraints to Self-Regulation:**
- Lack of Trust/Community Cohesion

**COGNITIVE AND EMOTIVE INFLUENCES: BIOSECURITY**

**SHARED BELIEFS**
PART II: The Cluster Analysis

The cluster analysis first examined the relationship between emotive beliefs regarding the future of farming and direct behavioural impacts such as membership in a scheme, and the level of bio-security measures implemented on-farm. Second, these attitudes were explored in relation to notions regarding compulsory vs. voluntary bio-security regulations. Finally, any attitudinal differences among farmers directly vs. indirectly impacted by an exotic disease threat (the FMD epidemic in 2001) were explored.

The preliminary analysis revealed the importance of responses to the future of farming to subsequent perceptions regarding bio-security. Therefore, the results are primarily presented in relation to this question.

5.1 Views of the Future and Bio-security Behaviours

The following figure explores the relationship between membership in an animal health scheme and views regarding the future of farming.

**Figure 4: Future of Farming and Scheme Affiliation Dendogram**

From the analysis, two distinct clusters can be identified. Those farmers with a positive view of the future of farming were clearly associated with scheme membership whereas those with negative views were less inclined to join the groups.

To further explore the relationship, the large number of bio-security measures offered by farmers were categorised as follows:

- **Measures to Combat External Threats**: includes wildlife control (particularly in relation to badgers and sparrows), reducing visitors (and lorries) on farm and controlling footpaths through land.
- **Infrastructural**: includes construction such as improved sheds/isolation areas and concrete pads/washing bays.

- **Herd-Level**: includes closed herd, buying ‘clean stock’, vaccination and various other disease control protocols, decreased stocking levels, and following accepted husbandry and management strategies.

- **Hygiene-related**: includes use of dips on entry to animals, disinfect people/clothes/boots, wash/disinfect vehicles, disinfect/fumigate housing, disinfect prior to market, etc.

- **Farmer Communication/Cooperation**: includes monitoring livestock disease threats and communicating disease related issues to other farmers.

Figure 5 displays the results of the analysis.

**Figure 5: Future of Farming and Bio-security Behaviour Dendrogram**

The dendrogram illustrates two relationships. First, those participants with a positive view of the future were more closely allied to the use of hygiene measures such as footbaths etc. Conversely, those farmers with negative views of the future are most strongly associated with herd-level bio-security measures such as keeping a closed herd etc. Interestingly, those farmers who reported making infrastructural investments in bio-security were also more likely to view communicating disease threats to other farmers as a key measure to combat livestock disease threats. Not surprisingly, an investment in infrastructure also related to measures designed to combat external threats such as wildlife and farm visitors.

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7 Examples include isolating sick animals, recording disease events/treatments, implementing a Herd Health Plan etc.
Thus, those farmers with more positive attitudes toward the future were more willing to invest in bio-security measures and equally importantly, join animal health schemes.

5.2 Views of the Future and Attitudes toward Regulation

The analysis also explored if there was a relationship between views regarding the future and attitudes toward bio-security regulation. Hence, farmers were asked whether measures should be mainly compulsory or voluntary or whether bio-security could be self-regulated in farmers groups. The results of the analysis are illustrated below (Figure 6).

**Figure 6: The Future of Farming, Compulsory vs. Voluntary Bio-Security**

Again, the dendrogram illustrates two clear trends. First, participants with positive views of the future also believed that farmers could self-regulate on issues regarding bio-security. As such, these participants supported voluntary rather than compulsory regulations. Conversely, participants with negative views of the future supported compulsory bio-security regulations driven by the government or other external body.

To further explore the finding, both negative and positive responses were further disaggregated into the following groups:

- **Individual Factors Impacting Group Effectiveness**: includes such notions as the ‘lack of consensus between farmers’, ‘lack of incentives’, ‘lack of leadership’, ‘lack of cohesion and trust’ and ‘lack of time’.

- **External Factors/Responsibility**: includes ‘too much government interference’, ‘lack of government interest’, ‘lack of faith (trust) in government policy’ and ‘solely the government’s responsibility’.
• **Collective Factors Inhibiting Group Behaviour:** includes perceptions such as ‘costs too high’, ‘groups work less effectively’ and the ‘heterogeneity of farming community prevents collective behaviour’.

• **Collective Factors Facilitating Group Behaviour:** includes notions such as ‘groups can work more effectively’, ‘groups are more pro-active’, and ‘farmers have more/relevant knowledge’.

**Figure 7: The Future of Farming and Group Self-regulation Dendrogram**

As the figure illustrates, notions regarding negative external factors relating to bio-security such as the government’s lack of interest etc. were closely associated with those factors inhibiting collective action at the group level such as lack of leadership and cohesion within groups. Thus, while farmers ostensibly supported compulsory regulation of bio-security (Figure 6), there was little faith in the institutions involved. Farmers groups, however, were viewed as equally problematic. The finding further supports the results of the content analysis i.e. while there was little trust in the government, there was equally little trust within and between community members.

To further explicate additional influences shaping farmer’s views and behaviour toward bio-security, the main sources of information regarding bio-security were explored.

**5.3 Sources of Information Regarding Animal Health**

To perform the analysis, reported information sources regarding bio-security were categorised as follows:

1) Veterinary surgeon
2) Farmer’s media (e.g. Farmers Weekly, Farmers Guardian, etc)
3) National media (e.g. TV, Radio, Newspapers, Internet)
4) Private sector actors (e.g. contractors, feed reps, colleges etc.)
5) Government agencies (e.g., DEFRA, local councils/assemblies)
6) Other farmers/self (e.g. friends, neighbours, own experience)

The above information sources were then compared to the attitudes towards bio-security regulation (Figure 8).

Figure 8: Bio-security Regulations vs. Information Sources Dendrogram

As the figure demonstrates, those farmers who did not agree with group-regulation tended to receive information from their vet, the farmer’s media and other farmers. Conversely, those who viewed self-regulation as possible and supported voluntary regulation strategies were clustered underneath information sources such as farmer’s associations and government agencies. Within this group, a strong association was found between private sector sources of information and the national media.

Thus, while emotive factors such as the view of the future related to the adoption of specific bio-security measures, the overall informational context in which these measures occur appears to have an equal role in forging attitudes and behaviours regarding bio-security. The following section further explores cognitive factors relating to the impacts of livestock disease.
5.4 The Impacts of the FMD Outbreak

Prior experience of a disease outbreak could be classified as a cognitive factor in relation to bio-security attitudes. Therefore, within the context of FMD, the study explored three levels of impacts:

1) Direct impacts (i.e. animals culled)
2) Indirect impacts (i.e. market and movement impacts)
3) No reported impacts
Interestingly, the strongest association was found between those farmers with a positive view of the future having been directly impacted by the FMD epidemic. Positive views, however, were also associated with no impacts. Conversely, those farmers who had been indirectly affected via movement restrictions etc. tended to have more negative views of the future of farming. The finding may be explained by the generous nature of the compensation packages received by those farmers whose animals had been culled during the epidemic.

Next, attitudes towards bio-security regulation strategies were explored in association with FMD impacts.

As the figure illustrates, those farmers, who were directly impacted by FMD, were more closely associated with the view that regulation should be voluntary and that group regulation could be effective. Conversely, farmers reporting indirect affects were more likely to agree with compulsory regulation and notions that self-regulation was not possible. Thus, although the farmers whose animals had been culled had received compensation, it is clear that this compensation was viewed as separate and distinct from bio-security regulations.
5.5 Summary of Cluster Analysis

The results of the cluster analysis demonstrate that a positive view of the future had the largest relationship in forging attitudes toward bio-security. Indeed, while representing only a minority of farmers, those individuals who believed the future of farming was more secure noted that self-regulation was both possible and desirable and acted upon these beliefs by joining an animal health scheme. These individuals tended to receive information about bio-security from private sector actors and/or the national media. Nevertheless, this group also had an association with information transfer from government agencies. However, attitudes regarding the utility of the information received from this source were largely consistent with earlier findings. Finally, bio-security measures for this group tended to revolve around improving on-farm hygiene and implementing measures such as boot dipping etc. Interestingly, however, being ‘culled out’ during the 2001 FMD epidemic was associated with positive, rather than negative views of the future. The finding, as detailed above, may be explained in relation to the compensation packages received by the farmers involved.

Conversely, farmers with a negative view of the future tended to participate in different bio-security measures and received information primarily from their vet. However, as noted in the content analysis this source was utilised mainly on an ‘as needed’ rather than a regular basis. As such, this level of contact could skew the overall consistency and timeliness of the bio-security information obtained. Interestingly, however, these participants reported the strongest association with the exchange and transfer of bio-security information with other farmers. Thus, those farmers with more negative views of the future, at least ostensibly, had higher levels of social capital with regard to bio-security knowledge transfer.

The following figure summarises the results of the cluster analysis.
Figure 11: Cluster Analysis Results

**POSITIVE**

**Regulation:** Voluntary

**Groups - Yes:** i.e. groups more effective, farmers have more/ relevant knowledge

**Experience:** Animals culled during FMD outbreak.

**Behaviour:** Farm level bio-security measures related to hygiene

**Information source:** Private Sector Actor, National Media

**NEGATIVE**

**Regulation:** Compulsory

**Groups - No:** i.e. lack of consensus, cohesion, leadership etc.

**Experience:** Indirectly affected by FMD, e.g. movement restrictions, market access.

**Behaviour:** Farm level bio-security measures related to the herd, e.g. closed herd, buying clean stock, isolation etc.

**Info source:** Veterinary Surgeon
6. Conclusions and Recommendations

The results of the content analysis revealed a high level of cognitive dissonance regarding perceptions of bio-security by participating farmers. Indeed, while negative attitudes toward past, present and future livestock disease threats were generally framed in relation to external agents, few of the farmers involved desired a greater role or responsibility in animal health. Equally, the cluster analysis revealed that overall beliefs regarding the future of farming had the largest role to play in the preferred source of bio-security information, the actual measures adopted, in addition to attitudes regarding group initiatives.

Thus, given the widely held ‘collective definition’ regarding the negative future of livestock farming and the equally strong notions regarding the attribution or blame for livestock disease threats, there is little likelihood of a spontaneous rise in farmers groups to address bio-security issues in the near future.

Hence, changing attitudes toward bio-security will be a major challenge in supporting any form of collective behaviour on this issue. A key first step appears to be a reframing of bio-security communications. According to psychologists, messages to support attitudinal change require three factors: a credible communicator, a high level of ‘similarity’ between the audience and communicator and finally, both the message and communicator must be perceived as trustworthy (Petty and Cacioppo, 1981). The study found a high degree of hostility over government-derived bio-security messages, thus the source is not perceived as credible and/or trustworthy. Equally, problematic, many farmers noted that ‘the government workers’ were not practical and lacked an understanding of farming. Therefore, notions of ‘similarity’ are low between these two groups. Due to these perceptions, the actual content of bio-security messages, regardless of quality or inherent worth, are unlikely to be viewed fairly.

While local vets were a primary source of information for many of the study farmers, they were an ‘occasional’ rather than regular source. As such, within an outbreak situation, the communication pathways are unlikely to be sufficiently strong to forge high levels of co-operation and therefore, behavioural change. The farmer’s media was also perceived as a trusted source of information, with high weekly and monthly usage levels. Nevertheless, the media has wider objectives and cannot be counted upon as either a sole or neutral source of bio-security information, particularly in an outbreak situation.

Consequently, to enhance the uptake of messages and forge collective behaviour regarding bio-security at the community level, a new approach is required. To be most effective such an approach should support a neutral communication platform with both
messages and communicators tested for similarity levels, trust and credibility. As such, further research in this area is required.
References


