

1 **True cowmen and commercial farmers: Exploring vets' and dairy farmers' contrasting**  
2 **constructions of 'good farming' in relation to biosecurity in England**

3 **Abstract**

4 Responsibility for biosecurity in UK farming is being devolved from government to industry, with a  
5 greater emphasis on the veterinarian (vet)-farmer relationship. Although social science has shown  
6 that care for animals is part of 'good farming', the British dairy sector sees a need to improve  
7 biosecurity. This research uses the good farmer concept to compare how vets and dairy farmers  
8 define good farming for biosecurity based on qualitative interviews with 28 vets and 15 dairy  
9 farmers in England. The results revealed two conflicting 'good farmer' identities: the large,  
10 commercial farmer who has the economic capital to invest in biosecurity and veterinary services;  
11 and the self-sufficient stock keeper whose cultural and social capital lead them to manage herd  
12 health independently. These identities reflect the changing 'rules of the game', and increasing  
13 penetration of vets' cultural capital into the sector. They involve different constructions of risk which  
14 need to be recognised within debates about good biosecurity.

15 **Introduction**

16 Biosecurity is defined as a set of practices that stop the spread of disease onto or out of an area  
17 where farm animals are present (Defra et al., 2004). Biosecurity encompasses all disease challenges  
18 farmers face including endemic diseases such as bovine tuberculosis, exotic disease threats such as  
19 foot and mouth disease and ongoing, prevalent problems on farms such as lameness and mastitis  
20 (Brennan & Christley, 2012). There is a perception within the industry that biosecurity in the dairy  
21 sector is not optimal and could be improved (Brennan & Christley, 2013; Cook, 2013). Improving  
22 biosecurity in the dairy sector is seen as a key priority for the industry and government, and since  
23 the 2004 Animal Health and Welfare strategy (Defra et al., 2004) the UK government has devolved  
24 more responsibility for biosecurity to industry, with an emphasis on the relationship between the vet  
25 and farmer (Enticott, 2014).

26 Similarly to dairy sectors in other developed countries, cost increases, fluctuating milk prices,  
27 removal of production subsidies and lack of farmer succession have led to a dramatic decline in the  
28 number of UK dairy farms – from over 30,000 in 1995 to just over 13,000 in 2015 (The Andersons  
29 Centre, 2013). These challenges to the dairy sector have had knock on impacts on the farm animal  
30 veterinary profession in the UK with fewer dairy farm clients and a reduced demand for veterinary  
31 services among those which remain, as farmers adjust to economic pressures (Lowe, 2009). The farm  
32 animal veterinary profession has also been impacted upon by its reduced role within government  
33 (Enticott et al., 2011), and competition for advisory services from nutritionists and consultants  
34 (Ruston et al., 2016). The farm animal veterinary profession is trying to move from the “test and  
35 treat” model of curing individual sick cows to a “predict and prevent” model where they act as  
36 disease prevention consultants on farm (Atkinson, 2010; Lowe, 2009; Orpin & Sibley, 2014; Van der  
37 Leek, 2015)..

38 Research on the influence of external actors on farmers has shown that farmers are likely to be  
39 influenced by advisors if their advisors' input is considered to be credible, salient and the actors to  
40 have legitimacy (Eastwood et al., 2017; Ingram et al., 2016; Prager et al., 2017; Sutherland et al.,  
41 2013). The use of psycho-social models such as theory of planned behaviour and social identity  
42 theory shows that farmers are more likely to be influenced by “in group” members rather than “out  
43 group” members such as urban populations (Fielding et al., 2008). Studies have shown that farmers  
44 use their vet as their primary source of information and advice on animal health (Garforth et al.,  
45 2013; Gunn et al., 2008) and that there is a high level of trust between vets and farmers (Ruston et  
46 al., 2016). Vets can be seen to have a hybrid identity as in and out group members, connected to the  
47 farming community, but also outside of it which makes them ideal interpreters and translators of

48 farming policy and biosecurity objectives to farmers (Enticott, 2012). However, there are also  
49 tensions and challenges within the vet-farmer relationship. Vets express frustration that they cannot  
50 interact with farmers enough to improve biosecurity, farmers do not take their advice, and  
51 biosecurity should be a greater priority for the dairy sector (Shortall et al., 2016). Vets can have  
52 different roles within government, industry and private practice (Escobar & Demeritt, 2017); this  
53 paper focuses on the vet-farmer relationship within private practice.

54 Although social science research into farmers' biosecurity practices is limited (Naylor et al., 2016),  
55 recent research has identified the importance of the cultural meanings farmers bring to biosecurity  
56 practices. Despite research suggesting low levels of uptake of biosecurity measures (Brennan and  
57 Christley, 2012), previous social science research has shown that taking care of animals' health and  
58 welfare is seen as a key part of good farming identity (Burton, 2004; Butler & Holloway, 2015; Gray,  
59 1998; Haggerty et al., 2009; Naylor et al., 2016; Sutherland, 2013; Wilkie, 2005) (Burton, 2004; Gray,  
60 1998; Naylor et al., 2016; Sutherland, 2013) and biosecurity (Higgins et al., 2016). This research is  
61 thus at odds with the veterinary epidemiology literature, which consistently identifies a  
62 disconnection between farmer practices and biosecurity standards advocated by industry, vets and  
63 government bodies (Derks et al., 2012; Gunn et al., 2008; Hall & Wapenaar, 2012; Heffernan et al.,  
64 2008; Pritchard et al., 2015).<sup>i</sup>

65 We assess these inconsistencies through use of the "good farmer" construct. Proponents of the  
66 good farming concept argue that farmers gain social standing through adherence to locally  
67 recognised symbols and performances of 'good farming' practice (Sutherland and Darnhofer, 2012),  
68 which influence a range of behaviour, including biosecurity (Naylor et al., 2016). In this paper, we  
69 contrast farmers' perceptions with the definitions of good farming practices held by vets in private  
70 practice and assess the role of livestock vets in the evolution of good farming identity.

## 71 **Conceptualising 'good farming'**

72 Assessments of 'good farming' commonly draw on Bourdieu's concepts of capital (Burton et al.,  
73 2008; Butler & Holloway, 2015; Haggerty et al., 2009; Sutherland, 2013; Sutherland & Darnhofer,  
74 2012). Bourdieu's work explores power dynamics within society and how power and social order are  
75 reproduced and transformed (Bourdieu, 1984). Bourdieu introduces the concept of habitus, which is  
76 a socialised body that is both influenced by the structures of the world around it and also interprets  
77 and processes these structures in a way that allows for individual autonomy (Holt, 2008). The  
78 concept of the habitus can be used to understand a single person's trajectory or that of a group  
79 through Bourdieu's concept of a class habitus (Bourdieu, 1984). The concept of habitus can be seen  
80 as a tool for exploring the social world and a way of asking questions of data which allows for an  
81 exploration of individuality and structures acting on individuals and groups (Reay, 2004).

82 For Bourdieu, the habitus exists within a field of social structures which is governed by 'rules of the  
83 game'. These rules are internalised within the habitus and govern responses within the field. Change  
84 comes about when a habitus enters a new social field, or a different part of a social field and the  
85 rules of the game the person has internalised do not match the new external rules of the game they  
86 experience (Reay, 2004). According to Bourdieu (1998) this leads to a divided self, struggling to  
87 adapt to new rules of the game and assimilate different identities.

88 The field within which a habitus develops is conceptualised as a competitive arena where people vie  
89 for different kinds of capital. According to Bourdieu (1986) capital is accumulated through labour  
90 and comes in the form of economic capital – material and financial property; social capital –  
91 networks of connection with other people; and cultural capital – signs of prestige and status.  
92 Cultural capital can exist in different forms: in institutionalised form such as educational  
93 qualifications, in objectified form of high status goods, and in embodied form in skills and mental  
94 dispositions acquired over time which are visible to others (Bourdieu, 1986). Critically, these types of

95 capital are exchangeable to various degrees – economic capital can be exchanged for cultural or  
96 social capital (e.g. utilised to develop skills or gain access to particular social groups). Capital acts as a  
97 conservative force in the world; capital has the potential to produce profits and to reproduce itself,  
98 meaning that not all outcomes are equally likely in the social world – those with capital are likely to  
99 produce more capital, those without must invest more labour to produce capital (Bourdieu, 1986).

100 Using Bourdieu’s theory, farmers will strive to be good farmers according to the rules of the game  
101 and accumulate different kinds of capital within the field of agriculture (Sutherland and Darnhofer,  
102 2012). Much of the early good farming literature argued that farmers are resistant to change – that  
103 cultural capital ensures that things stay the same, because farmers get both economic and cultural  
104 value out of performing actions which are symbolic of being a good farmer (e.g. Burton, 2004;  
105 Burton et al., 2008). More recent literature has argued that good farming standards can and do  
106 change, but it takes time. The cultural capital inherent in good farming leads to a degree of inertia,  
107 but when farmers are challenged in some way (particularly if practices are no longer profitable),  
108 then farmers will change their activities and renegotiate associated good farming standards  
109 (Sutherland, 2013; Sutherland and Darnhofer, 2012). Sutherland (2013) argues that commercial  
110 farmers’ cultural capital reflects Bourdieu’s (1984) conception of the ‘taste of necessity’ – to remain  
111 a commercial farmer, the farm must be commercially viable; symbols of good farming therefore  
112 embody evidence of a viable farm. In addition, farms within different geographic regions,  
113 agricultural sectors and production markets such as organic and conventional have been shown to  
114 have different ideals of good farming (Sutherland, 2013). Previous studies have shown how good  
115 farming is associated with economic capital in the form of agricultural machinery and equipment  
116 (Butler & Holloway, 2015); social capital in the form of social ties and mutual obligations between  
117 farmers (Flanigan & Sutherland, 2016; Sutherland & Burton, 2011), cultural capital in the form of  
118 prestigious skills, knowledge, experience and symbols of good farming such as a tidy fields and well-  
119 kept livestock (Burton, 2004; Butler & Holloway, 2015; Haggerty et al., 2009; Naylor et al., 2016;  
120 Sutherland, 2013) and farmers’ agricultural pedigree and connection to a farming family (Burton,  
121 2004).

## 122 **Good farming and biosecurity**

123 A small number of studies have used the good farming concept in relation to animal disease. These  
124 studies have shown that good farming is exemplified through the cultural capital embodied in stock  
125 keeping skills: having the skills to assess the health and welfare of an animal by eye (Naylor et al.,  
126 2016; Burton, 2008; Butler & Holloway, 2015; Haggerty et al., 2009). Good farming is also  
127 exemplified in the objectified cultural capital in healthy and profitable animals (Wilkie, 2005; Naylor,  
128 2016), and high standards of animal welfare (Haggerty et al., 2009). The condition of a farmer’s  
129 livestock can be ‘read’ by other farmers through visual signs of health and vitality such as a shiny  
130 coat, bright eyes and alertness and energy in movement to assess the farmer’s level of skill as a stock  
131 keeper (Burton et al., 2008). Naylor et al. (2016) carried out a study on good farming in relation to  
132 exotic diseases and identify three good farmer ideals: stock keeping skills and care for the animals;  
133 being a good neighbour and not causing biosecurity problems for the sector – in terms of buying and  
134 selling animals with care and culling animals when they pose a risk to other farmers; and the good  
135 public facing farmer who has a reputation for biosecurity.

136 The changing ‘rules of the game’ addressed here primarily relate to economic duress and  
137 intensification. Wilkie (2005) argues that the role and importance of the stock keeper has changed  
138 with the industrialisation and intensification of agriculture; larger herd sizes mean that farmers may  
139 not be able to get to know their animals individually. The result is a change from “husbandry to  
140 industry” (Wilkie, 2005 p.216). This change has been highlighted in recent literature on  
141 mechanisation: Butler & Holloway (2015) showed how adopting automatic milking systems could  
142 change the farmer’s understanding of good farming, with practices of judging animals by eye being

143 partly or wholly replaced with the use of data to monitor health and wellbeing. Naylor et al. (2016)  
144 found understandings of good farming divided along the same lines in different sectors. In poultry  
145 and pig systems good farming consists of monitoring certain key performance indicators such as  
146 mortality rates and water intake, whereas in the cattle and sheep sectors good farming was  
147 identified as tacit skills and knowledge that allowed farmers to assess health and welfare by eye.  
148 Hansen (2014) shows how mechanised dairy production systems mean that workers need not have  
149 skill or experience working with animals. Haggerty et al. (2009) also found tensions within the notion  
150 of good farming in pastoral sheep production in New Zealand, with progressive ideas of intensifying  
151 production through increasing stocking density conflicting with some farmers' traditional views of  
152 caring for sheep to ensure their health and welfare.

153 Differing views of good farming between the different livestock systems mean that the dairy sector  
154 in the UK is a particularly useful arena in which to explore notions of good farming, as it can still be  
155 seen as a diverse sector: the changing rules of the game have led to average farm size increasing and  
156 increases in intensity<sup>ii</sup>, but the sector is still made up of a variety of production systems and  
157 ownership structures as farmers have responded in different ways to the changing rules of the game  
158 (The Andersons Centre, 2013).

159 This paper extends the concept of good farming to explore how a non-farmer group, private vets,  
160 understand and influence understanding of good farming in relation to routine biosecurity,  
161 contrasting the perspectives of vets and farmers. Naylor et al. (2016) include vets in their study using  
162 the good farmer concept, but in relation to a specific area of biosecurity: the management of exotic  
163 disease and more than half of those vets worked in government institutions rather than in regular  
164 contact with farmer clients. Good farming is a concept based on both individual and group norms – it  
165 is based on the farmer's own preferences and it is also an ideal which draws on and applies to the  
166 whole farming community. The same can be seen to be true of vets' views of good farming. Farm  
167 animal vets are deeply embedded in the farming milieu, with both theoretical and experiential  
168 knowledge of farming systems (Enticott, 2012). As actors in the farming field, who provide advice  
169 and assistance to farmers, they express and reinforce the 'rules of the game'. Their differing  
170 experience, knowledge and priorities may lead them to assess the farming rules of the game and the  
171 ideal of good farming for biosecurity differently to farmers.

172 The paper addresses the following questions: how do vets and farmers understand good farming in  
173 relation to biosecurity? What kinds of social, economic and cultural capital exchange are associated  
174 with different ideals of good farming for biosecurity? How have these different conceptions of good  
175 farming come about within the farming and veterinary professions, (within the context of changing  
176 and challenging rules of the game)? What are the implications for the future development of the  
177 vet/farmer relationship?

## 178 **Methods**

179 Qualitative interviews were carried out with 28 farm animal vets and 15 farmers in 2014. Purposive  
180 sampling was used to access a range of different views on biosecurity (Bryman, 2001). Vets from  
181 practices with a Royal College of Veterinary Surgeons (RCVS) farm animal accreditation were chosen.  
182 The RCVS are the statutory body that regulate the vet profession. Farm animal accreditation is a  
183 voluntary scheme which sets and assesses standards for vet practices in relation to provision of farm  
184 animal veterinary services. We contend that practices, and the vets working for them, which were  
185 proactive and obtained this accreditation, would have an interest in and knowledge of farm animal  
186 biosecurity. Demographic details of the interviewees are shown in table 1. The interviewees have  
187 been given a pseudonym in the results below, with the letter 'F' for farmer or 'V' for vet following  
188 their name.

189 The interviews were carried out by author 3 over a four month period in 2014 across England, with  
190 the highest proportion taking place in the midlands but also across the North East, North West,  
191 South East and South West. The majority of interviews were conducted in person, with a small  
192 number conducted over the phone and lasted between 40 and 75 minutes. The interviews followed  
193 a semi structured interview guide. Vets were asked about the nature of their practice and dairy farm  
194 clients, the types of services they provided and their views on biosecurity, the future of the dairy  
195 sector and the veterinary profession. Farmers were asked about their relationship with their vet, and  
196 their views on biosecurity and the future of the dairy sector. Vets and farmers were not asked  
197 directly what they thought constituted 'good biosecurity' or what made for a good farmer for the  
198 purposes of biosecurity, but rather these constructions emerged from the interviews. Interviews  
199 were audio recorded and transcribed by a third party. Ethical approval for the study was obtained  
200 from the School of Veterinary Medicine and Science, University of Nottingham.

201 Data was analysed by author 1 using NVIVO 11 qualitative analysis software. The data was analysed  
202 using thematic analysis (Coffey & Atkinson, 1996) with one set of themes focussing on types of  
203 farms and farmers, for example, large farms, small farms, farmers interested in animals, commercial  
204 farmers etc., in order to deconstruct how vets and farmers talked about different farmers and farm  
205 types in relation to biosecurity. During this coding process patterns were observed in the data which  
206 were then analysed using the good farmer concepts.

### 207 **Cultural capital of the traditional good stock keeper farmer habitus**

208 Consistent with previous studies (Burton et al., 2008; Haggerty et al., 2009; Higgins et al., 2016;  
209 Naylor et al., 2016), many of the farmers interviewed discussed good farming for biosecurity in  
210 terms of the cultural capital of good stock keeping skills and knowledge of the animals. For these  
211 farmers, watching the animals and knowing the animals well was a biosecurity practice in itself.

212 Claire (f): As daft as it sounds, you get your dominant ones; they're always there first at the  
213 door to come in to be milked. The first three, the same ones every time. Now, if that sequence  
214 altered, you're thinking, 'Well, come on then, what's happening here?'

215 Visual assessments were sometimes trusted to the point that they are seen to make other forms of  
216 testing an animal redundant:

217 Bill (f): I have a little philosophy which is completely wrong but it's mine; if you think an  
218 animal's wrong, it is wrong, it is ill. So, there's no point in taking its temperature because it is  
219 ill... I'm not going to treat it any differently so why would I bother taking its temperature? I can  
220 see it [the animal] is not right.

221 Here, taking the step of formally measuring a cow's temperature is perceived as duplicating what  
222 the farmer can already judge by eye, and therefore extraneous to managing the animal's health.

223 Some five of the vets interviewed praised stock keeping abilities in farmers and judged stock keeping  
224 skills as a way of assessing good farming ability.

225 Neil (v): We have got people that are true cow men, they love their cows and you get that with  
226 their mannerisms [...] if I went to a farm I have never been to before I could pick up cues as to  
227 what they would be like but I just observe it, what was going on.

228 The distinction is contingent on scale. In words of Dan (v):

229 Dan (v): When you have got a smaller farm quite often they are family farms and because you  
230 have got a lower number of animals they will know their cows better.

231 Phillip (f) gave the example of 1500 cow dairy farm he'd visited where:

232 Phillip (f): [...] there was no feel for the animals at all. They were there, they might as well of  
233 been a car factory making cars. They were there to produce milk. No feeling whatsoever.

234 This view reflects concern about the changing role of farmers from “husbandry to industry” (Wilkie,  
235 2005 p.216) and resonates with views that the mechanisation and upscaling of dairy farming leads to  
236 a de-skilled farmer habitus: farmers who do not have the opportunity to develop or exercise the  
237 traditional good farming stock keeping skills (Butler and Holloway, 2015). Thus according to these  
238 farmers and vets, it is more difficult for farmers who have responded to the changing rules of the  
239 game by upscaling and mechanising their farm to be seen as “good farmers”.

240 The increasing intensity of dairy production was also seen by some as being opposed to the good  
241 farmer habitus because the conditions the farm creates makes it difficult for cows to thrive.

242 Emily (f): Risk as well because there’s definitely, cows are under a lot more pressure now than  
243 they used to be because these diseases were obviously always were around but they become  
244 more of a problem when cows are under more pressure and I suppose when you’ve got larger  
245 groups in smaller places and that sort of thing.

246 Haggerty et al. (2009) showed how this view was also held by sheep farmers in New Zealand; good  
247 livestock farming involved maintaining conditions where animals could thrive, which was seen as  
248 incompatible with intensive farming.

249 However, other vets pointed out the limits of good stockmanship and visual skills in assessing  
250 animals, particularly in relation to diagnosis:

251 William (v): You can have farmers that you’ve been going to for years and years and years and  
252 then they suddenly say to you well, when you’ve done the assessment they say well nobody  
253 told me that markets were going to be a problem. I think there was a premise that the animal  
254 that looked healthy would be healthy and it’s not until you appreciate that for the majority of  
255 cattle diseases most of them are in a carrier state or a later state and they appear healthy and  
256 then carry disease through the herd.

257 Here the embodied cultural capital skill of visually assessing animals is seen as flawed because a  
258 disease may be present but not manifest itself in symptoms. In William’s example, the health status  
259 of the animal did not become problematic until the point of sale. This view is linked to the desired  
260 change within the veterinary profession of moving biosecurity from a curative model of ‘testing and  
261 treating’ diseases already present to ‘predicting and preventing’ disease threats to the herd (Sibley,  
262 2010). The farmers’ cultural capital of visual skills may be seen to be appropriate for the ‘test and  
263 treat’ model where animals are sick and exhibiting symptoms, but disease threats in the ‘predict and  
264 prevent’ model involve assessing animals that carry disease but may not yet exhibit symptoms, and  
265 disease risks which should be mitigated before they pose a threat to the farmers’ herd.

## 266 **Cultural and economic capital of the large, commercial farmer habitus**

267 The changing rules of the game that have pushed farmers to get bigger and increase production was  
268 seen by many vets, and to a lesser extent some farmers, as bringing about a farmer habitus that was  
269 more conducive to good biosecurity, than the traditional, extensive, good stock keeper farmer  
270 habitus.

271 Linda (v): We’ve already gone through the downsizing of the dairy industry around here. The  
272 ones that are here are in it to stay and they’ve invested heavily in it but because of that they’ve  
273 upped their management and they’re quite in control of what they’re doing so there’s less for  
274 us to do.

275 William (v) describes vets’ role in disease prevention:

276 William (v): It's a preventative health system we provide for farmers to help keep their herds  
277 healthy and obviously we provide an emergency service alongside that if things go wrong, but  
278 really the thrust of our business is all about interacting with farmers to optimise their health  
279 productivity and prosperity really.

280 Linda drew attention to reason for herd expansion – retaining viability in order to stay in the  
281 industry. An economic capital investment in increased herd size created more risks that made  
282 managing biosecurity a bigger priority, meaning they were more likely to listen to the vet's advice.

283 Oliver (v): Different input to sort farms out because they are big enterprises with a lot of  
284 money riding on them.

285 When asked why there is now a preventive approach to animal disease and if it wasn't needed in the  
286 past, vet Jim replies:

287 Jim (v): Well, I won't say we didn't need it. It just wasn't quite as used as much with the  
288 intensification of agriculture. The bigger they get then the potential for catastrophe also  
289 becomes bigger.

290 Because of this, vets perceived larger farmers as also being more likely to have protocols in place for  
291 implementing biosecurity. The financial viability of these farms also meant that the farmers could  
292 afford to invest both in vet services and in their own equipment, to reduce biosecurity risks.

293 Linda (v): Yes and the other thing we have is oral fluid pumps<sup>iii</sup>. So our big dairy farms will have  
294 their own pump. Because that is something that did worry us. That there might be spread of  
295 disease on the pumps because they're quite difficult to clean. [...] Big farms... can sort of justify  
296 the, the expense of it really.

297 Larger farms were also seen to be able to afford the extra labour needed to implement biosecurity  
298 measures. Thus, increasing the economic viability of the farm through expansion allows, and  
299 necessitates, financial and time investment in biosecurity.

300 In contrast, smaller farms were seen as not having the financial resources to invest in veterinary  
301 disease prevention advisory services, which the vets saw as a key part of good biosecurity.

302 Robert (v): The smallest herd would be probably be 80 to 100. But then you have less input, or  
303 less regular input on that sort. Yes, I think its economics really. Those kind of size farms are the  
304 ones that just carry doing what they've always done. They may well have fertility visits, but not  
305 as regularly.

306 Although bigger farms were seen as making greater use of the vet's biosecurity services, some vets  
307 and farmers also framed larger, more intensive farms in negative terms in relation to biosecurity.  
308 Increasing herd size is associated with a risk to the farmer of introducing disease and risk to the  
309 industry of spreading disease around the country.

310 Interviewer: Is there any reason for the increase [in disease prevalence] do you think?

311 Frank (v): Undoubtedly, more movements of cattle around this country because there aren't  
312 the local economies that there used to be, that's probably it. [...] When I have a client looking  
313 for replacements, he's often got to go a lot further away and out of the area. And some of  
314 these diseases are, like Johnes<sup>iv</sup>, it's a lot more widespread than it used to be and it's very  
315 difficult sometimes to know that a place might have it, if you're not looking for it.

316 Here the reference scale for good farming for biosecurity was widened from the individual farm to  
317 the dairy sector and the consolidation of farms is not seen as good for the biosecurity of the sector  
318 as a whole. The industry-wide risk of a more mobile livestock industry was described in a report on  
319 the emergence of foot and mouth disease where it was stated that scale of livestock movements  
320 took people in the farming industry by surprise following the outbreak (Anderson, 2002) and has

321 been analysed as a 'normal accident' (Perrow, 1999) waiting to happen in such a complex system  
322 (Law, 2006). Measures such as greater tracking of animal movements have been put in place to  
323 mitigate these risks (Duckett, 2014), but traded animals are imbued with risks. At the same time,  
324 there is considerable prestige in purchasing high quality livestock – the cultural capital associated  
325 with correctly identifying high quality animals, and the explicit display of economic capital in the  
326 purchase price. The good farmer as profitable farmer is evident in the transaction. This is explored  
327 further in the social capital section.

328 While the vets saw regular contact with farmers as an essential part of good biosecurity and  
329 therefore saw regular clients as good farmers for biosecurity, some farmers expressed the opposite  
330 view. Their identification of disease diagnosis and treatment skills as part of good farming meant  
331 that a farmer who was overly reliant on the vet was a bad farmer:

332 Phillip (f): It's not just the vets, some of the people looking after cows have become far too  
333 reliant on the vets and they're not capable of doing their own jobs. If a dairy farmer can't deal  
334 with ninety nine percent of what's wrong with a dairy herd then they shouldn't be looking  
335 after them.

336 Thus, this farmer does not wish to build the same type of social capital with the vets as the vets  
337 prefer, but rather the cultural capital of status as a good farmer is prioritised over developing social  
338 capital with the vet. This is further explored in the next section.

339 A summary of the types of capital held by the 'commercial farmer' habitus and the 'traditional good  
340 stock keeper' habitus are outlined in table 2 and 3 below.

#### 341 **The social capital costs of biosecurity for the traditional good stock keeper habitus**

342 Social capital in farming consists of webs of social networks and relations of mutual obligation built  
343 up over time (Sutherland & Burton, 2011). Social capital is seen as important for rural development,  
344 contributing to economic capital and making farmers more resilient in the face of disease threats  
345 (Naylor & Courtney, 2014). Acts of maintaining social capital with other farmers were seen by the  
346 vets as examples of the traditional farmer habitus and incompatible with good biosecurity, as social  
347 interaction also brings the risk of disease transmission (Nerlich & Wright, 2006). Livestock markets  
348 where farmers come together to buy and sell animals were seen by vets as a key example of  
349 farmers' sociability conflicting with good biosecurity.

350 Ben (v): And historical, you know it might be traditional, I've got a big client and his dad just  
351 loves going to market and buying cows and calves. And he just won't stop however much you  
352 talk to him. However much his son wants to be bit more biosecure.

353 This is framed in terms of the older farmer habitus grounded in tradition conflicting with the newer  
354 farmer habitus which involves a better understanding of biosecurity.

355 Similarly to assessing disease status visually, an animal's disease status was also assessed by farmers  
356 based on social ties with the animal's owner. Some vets deplored this practice and called for  
357 rigorous, test based methods of disease assessment.

358 Liz (v): We looked at how the disease had been brought into the farm which had been through  
359 the purchase of a bull which the farmer thought would be absolutely fine because he was  
360 buying it off his brother-in-law, so it would be no problem. So, in a way he'd ignored previous  
361 advice that, as a naive herd<sup>v</sup>, he needed to be extremely careful about his buying-in policy. He  
362 ignored that advice and bought the animal and brought the disease onto farm, so then we  
363 were able to accurately discuss the fact that being a member of the family doesn't mean you  
364 haven't got a disease.

365 Thus here, vets state that the farmer's trust in and kinship connection with the seller farm, key parts  
366 of social capital in farming, is used as a proxy for knowledge of the animal's disease status. Vets  
367 worked to separate this connection in the farmer's mind between the seller farmer and the reality of  
368 animal disease. This connection between the seller farmer and knowledge of the animal's disease  
369 status may be built on the moral dimensions of animal disease. The idea exists within agriculture  
370 that 'only bad farmers get diseases' (Heffernan et al., 2008). Thus, disease status may not only be  
371 used to assess how good a farmer is, but the reverse may also be true: someone thought of as a  
372 good farmer is not likely to have or sell diseased animals. Having the cultural capital of a good  
373 reputation is part of being a good farmer (Sutherland and Darnhofer, 2012) so cultural capital can be  
374 used to assess disease status, accessed through social capital networks built on trust and familiarity.

375 Because good farming is generally seen as associated with maintaining healthy livestock and a clean  
376 farm (Burton, 2004; Sutherland & Darnhofer, 2012) vets stated that some farmers were unwilling to  
377 discuss biosecurity with other farmers. Biosecurity was an awkward and difficult subject and risked  
378 insinuating that they thought the other farmer was not a good farmer.

379 Greg (v): They could never face the fear of offending them but it's true, it's real. I have cattle of  
380 my own and I find it very difficult when you start talking about disease status when you go to  
381 buy animals. You sometimes feel awkward insinuating they have disease; it's something that a  
382 lot of people will not do.

383 Farmers may rely on social connections and visual assessment rather than risk damaging their own  
384 social capital by offending a farmer by asking about animal disease. There is seen to be farmer  
385 etiquette relating to disclosing disease information when selling animals. Farmer Luke states this is  
386 good practice but not all farmers adhere to it.

387 Luke (f): [...] we are quite open with the fact that we have sold in the cattle in the past, or  
388 breeding stock, to other farmers and we have openly told them that we have Johnes. [...] A lot  
389 of farmers wouldn't tell you that and that has become because of the stigma attached to it. [...] I  
390 don't also want to be labelled with a label of saying that I have sold an infected animal down  
391 the road.

392 According to farmers there is a need to carry out certain biosecurity practices to maintain one's  
393 social capital in the farming community. Animal disease exists for farmers in a complex web of social  
394 norms and interactions which, though understandable to the vet are nevertheless frustrating and at  
395 times counterproductive.

396 Part of farming cultural capital is one's origins in a farming family and kinship connections with  
397 farming (Burton, 2004; Burton et al., 2012). Interestingly, because of the importance he placed on  
398 business skills rather than on the traditional farming skills and knowledge passed down, Oliver cited  
399 origin outside of farming as a signifier of a good farmer for the purposes of biosecurity.

400 Oliver (v): Speaking to people who work down the south west area, there's a bit more, it's a bit  
401 more lucrative, there are people coming into farming who have done a previous career, or who  
402 are just a lot more business minded, and they will generally be better at seeking professional  
403 advice and also having other enterprises on the go as well.

404 The idea of being a progressive farmer that is able to adapt to changing circumstances and remain in  
405 business is seen as part of good farming (Sutherland et al., 2012).

#### 406 **Formation of social capital between commercial farmers and vets**

407 The 'commercial farmer' habitus was more clearly lodged in objectified veterinary cultural capital.  
408 Recent research has demonstrated that social capital can be established in formal, paid interactions

409 (Flanigan and Sutherland, 2016), and formalising exchange can reduce associated risks (Sutherland  
410 and Burton, 2011). Fisher (2013) argues that the social relationship between vets and farmers is  
411 transformed into social capital through the longevity, consistency and regularity of contact, as well  
412 as trust between the partners. Vets' descriptions of their desired relationship with farmer clients  
413 accords with this framework and for many vets, it was the larger, more commercially oriented  
414 farmers who were able and willing to have this type of relationship with the vet. Relationships with  
415 commercial farmers are valued because they are seen to understand the need to use the vet as a  
416 disease prevention consultant rather than to treat individual sick animals: i.e. part of vets' desired  
417 move from a "test and treat" to a "predict and prevent" model of veterinary intervention. As both  
418 the farm animal veterinary profession and the dairy profession are seen to be facing existential  
419 challenges, vets value relationships with farmers who have shared goal of staying in business, rather  
420 than staying in farming until they retire or change job.

421 Robert (v): Well, it's obviously the larger herds that you have a closer association with and  
422 more regular visits to. And you know, a closer relationship with, and they're the people that  
423 will take your advice and in general will act on it. The more dynamic, go ahead, you know,  
424 larger units really.

425 Social capital is about networks which allow access to resources. Vet's scientific and economic  
426 knowledge of disease is a type of embodied and objectified cultural capital which they have  
427 obtained through their veterinary education. If the farmer engages the vet's services when buying in  
428 animals their understanding of disease thus changes. Within the farming field it is understood  
429 through stock keeping cultural and social capital connections with farmers i.e. healthy looking  
430 animals and animals owned by farmers with a good reputation and with whom one has close ties are  
431 unlikely to be diseased. Within the veterinary field disease is understood through the lens of  
432 economic and scientific cultural capital: disease is understood in terms of tests and results produced  
433 in laboratories and has economic consequences on the farm (Law & Mol, 2011). This requires a  
434 transformation of social and cultural capital and it according to many of the vets it is the 'commercial  
435 farmers' who are developing the cultural, economic and social capital to do this.

#### 436 **Discussion and conclusion**

437 The paper has demonstrated the divergent definitions of 'good farming' in relation to biosecurity  
438 The clear distinctions between the two good farming ideals is indicative of the capital exchanges  
439 which occur when farmers negotiate the changing rules of the game. Different forms of cultural  
440 capital are privileged in the two positions. Both farmers and vets contrasted the cultural capital of  
441 stock keeping skills with the more 'hard-nosed' commercial farmer habitus. However, the  
442 'commercial' farmer identity is more directly influenced by the objectified cultural capital of  
443 veterinary expertise. The findings have also demonstrated the cultural and social capital costs  
444 farmers may face in accumulating economic capital under current 'rules of the game'.

445 This study accords with Naylor et al.'s (2016) findings of three good farmer ideals in relation to  
446 biosecurity of stock keeping skills and care for the animals; being a good neighbour and not causing  
447 biosecurity problems for the sector; and the good public facing farmer who has a good reputation  
448 for biosecurity. This study elaborates on those findings by showing the contested nature of stock  
449 keeping skills as part of good farming, and the different interpretations of what it means to be a  
450 responsible neighbouring and public facing farmer who does not create risks for the sector. Risk is  
451 constructed in different ways in relation to the types of capital held by the good stock keeper and  
452 the commercial farmer. According to vets who value the commercial farmer habitus, stock keeping  
453 practices of judging an animal by eye, basing buying in decision on social connections with farmers,  
454 and socialising with other farmers in an agricultural context are risky practices which allow the  
455 spread of disease. On the other hand, some farmers and vets frame the commercial farmer habitus  
456 with increased milk production that compromise the cow's immune system, leading to greater

457 animal movement through buying in animals and consolidating the sector within regions and on  
458 large farms as increasing the disease risks the sector faces.

459 Previous research has suggested the financial pressure dairy farmers are under is a limiting factor on  
460 improving biosecurity (Alarcon et al., 2014; Derks et al., 2012; Ellis-Iversen et al., 2010; Gunn et al.,  
461 2008; Sayers et al., 2013). Findings suggest that this plays out differently depending on herd size:  
462 financial pressure increases the risks associated with animal acquisition and production intensity,  
463 but also the impetus for larger-scale farmers to seek and implement veterinary advice. This also  
464 leads them to develop a closer relationship with the vet and use them as a disease prevention  
465 consultant (formalised social capital). Here a self-reinforcing circle is created where the returns from  
466 invested economic capital mean more economic capital and labour is available to invest in  
467 biosecurity. Closer contact with the vet leads them to integrate the cultural value placed by vets on  
468 scientific understanding of disease into their own habitus, meaning they are more likely to take the  
469 vets' advice (cultural capital). From the vet's point of view these are the farmers that are likely to  
470 stay in business and support vets' change in role to disease advisory consultants, meaning that work  
471 is put into maintaining these relationships (social capital).

472 By emphasising the preventative veterinary model as ideal, veterinarians implicitly devalue the  
473 husbandry skills of farmers. The idea of good biosecurity as embodied by the commercial farmer  
474 habitus does not recognise the farmers' embodied skill and biosecurity practices of care for animals  
475 (Higgins et al., 2016). This may explain the view described in the introduction within veterinary  
476 epidemiology literature that improvements in biosecurity is required in the dairy sector (references  
477 needed here). In vets' accounts of good biosecurity, farmers who sweep away all the complicated  
478 social norms and social relationships around animal disease are good farmers. But this requires a  
479 significant cost for farmers. Their identity as good stock keepers or their skills in assessing animals  
480 and judging disease by eye are not recognised, they have to forgo social contact in a farming context  
481 at events such as livestock markets and they have to renegotiate social relationships with other  
482 farmers to discuss the difficult subject of animal disease.

483 The vet is the gatekeeper for animal health networks relating to disease testing, government and  
484 industry biosecurity rules and regulations, animal disease certification schemes and medications. In  
485 the veterinary field animal disease is understood as a scientific object: in the clinical veterinary field  
486 disease can be seen through visual signs in the animals, in the laboratory it can be seen through the  
487 tests demonstrating the presence of a pathogen, and in veterinary epidemiology disease is manifest  
488 through patterns of disease transmission in populations (Law & Mol, 2011). In the veterinary field  
489 animal disease is also understood through an economic lens: the move from the 'test and treat' to  
490 'predict and prevent' model involves a change in focus from the individual cow to the herd as a  
491 whole and the significance of disease changes from the welfare of each cow to the productivity of  
492 the whole herd manifest through production and profitability metrics (Barkema et al., 2015). Farm  
493 management and economics is part of veterinary training and there are calls for this to become a  
494 bigger component if vets are to move to the role of consultants (Lowe, 2009).

495 According to vets, the farmers' pre-existing cultural capital of business skills may contribute to their  
496 development of a commercial farmer habitus, if for instance they are new entrants to the farming  
497 sector and bring these skills with them from outside the field of farming, as reported by the vet  
498 Oliver. If these cultural capital business skills are activated, the process of change from the good  
499 stock keeper farmer habitus to the commercial farmer habitus is facilitated by a change in cultural  
500 and social capital.

501 The 'commercial farmer' and 'good stock keeper' constructions of good farming for biosecurity in  
502 the dairy sector draw on different assumptions and responses to the changing rules of the game.  
503 The rules of the game in the dairy sector in the UK are increasing the size and productivity of dairy  
504 farms, as well as the cows spending more time indoors (March et al., 2014), mirroring intensification

505 in other countries with a developed agricultural sector (Hansen, 2014). More research could be  
506 undertaken on how other influential industry and government actors conceptualise good farming  
507 biosecurity for biosecurity going forward. As the process of intensification of dairy farming  
508 continues, there is a danger that debates around biosecurity coalesce on the skills, social networks  
509 and economic capital of the commercial farmer habitus as good farming for biosecurity and the idea  
510 of the traditional stock keeper farmer habitus as a danger to biosecurity, ignoring the different ways  
511 risk is constructed in the two accounts of good farming.

512 Further research could also usefully assess the vet habitus, which can be seen to be socialised in and  
513 operate within the farming field and the scientific field of animal disease simultaneously. Vets must  
514 have in depth knowledge of farming practice and business in order to be taken seriously by farmers:  
515 just as vets have their own ways of judging a good farmer, farmers do not respect vets who do not  
516 know how to interact with animals or who do not understand the minutia of livestock farming  
517 practice (Kaler & Green, 2013). Vets regularly come from a farming background: Adam (2015) found  
518 that vets who stay in farm animal work are significantly more likely to come from a farming  
519 background. Thus many farm animal vets come from the same field as farmers, are raised in the  
520 same milieu and exposed to the same rules of the game growing up. Thus this can be seen to  
521 account for overlaps in how farmers and vets assess cultural capital around good farming for  
522 biosecurity in terms of good stock keeping skills and a clean farm. There are is also variation within  
523 the farm animal veterinary profession and vets' willingness and ability to move towards a  
524 consultancy role which vets identified as more appealing to the commercial farmer habitus (Ruston  
525 et al., 2016). And though it did not emerge strongly in these interviews, previous research has shown  
526 how a large part of the vet's job, similar to that of the farmer, involves practices of care: care for the  
527 animals, care for the farmer and care for themselves (Law, 2008).

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531 **Bibliography**

- 532 Adam, K. (2015). *The future of the farm animal practice in a changing veterinary business landscape*.  
533 London.
- 534 AHDB Dairy. (2016). *Dairy statistics: An insider's guide 2016*. Kenilworth. Retrieved from  
535 [http://www.dairyco.org.uk/non\\_umbraco/download.aspx?media=1438](http://www.dairyco.org.uk/non_umbraco/download.aspx?media=1438)
- 536 Anderson, I. (2002). *Foot and Mouth Disease 2001: Lessons to be Learned Inquiry Report*. London.
- 537 Atkinson, O. (2010). *The role of the vet in knowledge transfer in the dairy industry*. Taunton.
- 538 Bourdieu, P. (1984). *Distinction*. Padstow: Routledge.
- 539 Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of Theory and Research*  
540 *for the Sociology of Education*. New York: Greenway.
- 541 Bourdieu, P. (1998). Social Space and Symbolic Power. *Sociological Theory*, 7(1), 14–25.  
542 <https://doi.org/10.2307/202060>
- 543 Brennan, M. L., & Christley, R. M. (2012). Biosecurity on cattle farms: A study in north-west England.  
544 *PLoS ONE*, 7(1), e28139. <https://doi.org/10.1371/journal.pone.0028139>
- 545 Brennan, M. L., & Christley, R. M. (2013). Cattle producers' perceptions of biosecurity. *BMC*  
546 *Veterinary Research*, 9, 71. <https://doi.org/10.1186/1746-6148-9-71>
- 547 Bryman, A. (2001). *Social Research Methods*. Oxford: Oxford University Press.
- 548 Burton, R. J. F. (2004). Seeing through the “good farmer”s’ eyes: Towards developing an  
549 understanding of the social symbolic value of “productivist” behaviour. *Sociologia Ruralis*,  
550 44(2), 195–215. <https://doi.org/10.1111/j.1467-9523.2004.00270.x>
- 551 Burton, R., Kuczera, C., & Schwarz, G. (2008). Exploring Farmers’ Cultural Resistance to Voluntary  
552 Agri-environmental Schemes. *Sociologia Ruralis*, 48(1), 16–37.
- 553 Butler, D., & Holloway, L. (2015). Technology and Restructuring the Social Field of Dairy Farming:  
554 Hybrid Capitals, “Stockmanship” and Automatic Milking Systems. *Sociologia Ruralis*, 56(4).  
555 <https://doi.org/10.1111/soru.12103>
- 556 Coffey, A., & Atkinson, P. (1996). *Making sense of qualitative data: Complementary Research*  
557 *Strategies*. London: Sage Publications.
- 558 Cook, A. J. C. (2013). Implementing biosecurity on dairy farms: Rewriting the “cultural script.”  
559 *Veterinary Journal*, 197(2), 118–119. <https://doi.org/10.1016/j.tvjl.2013.03.050>
- 560 Defra, Scottish Executive, & Welsh Assembly Government. (2004). *Animal Health and Welfare*  
561 *Strategy for Great Britain*. London.
- 562 Derks, M., van de Ven, L. M. a, van Werven, T., Kremer, W. D. J., & Hogeveen, H. (2012). The  
563 perception of veterinary herd health management by Dutch dairy farmers and its current status  
564 in the Netherlands: A survey. *Preventive Veterinary Medicine*, 104(3–4), 207–215.  
565 <https://doi.org/10.1016/j.prevetmed.2011.12.019>
- 566 Duckett, D. (2014). *Barriers to farmer adoption of cattle EID* (Vol. 2014). Edinburgh.

- 567 Eastwood, C., Klerkx, L., & Nettle, R. (2017). Dynamics and distribution of public and private research  
568 and extension roles for technological innovation and diffusion: Case studies of the  
569 implementation and adaptation of precision farming technologies. *Journal of Rural Studies*, 49,  
570 1–12. <https://doi.org/10.1016/j.jrurstud.2016.11.008>
- 571 Enticott, G. (2012). The local universality of veterinary expertise and the geography of animal  
572 disease. *Transactions of the Institute of British Geographers*, 37(1), 75–88.  
573 <https://doi.org/10.1111/j.1475-5661.2011.00452.x>
- 574 Enticott, G. (2014). Relational distance, neoliberalism and the regulation of animal health. *Geoforum*,  
575 52(MARCH 2014), 42–50. <https://doi.org/10.1016/j.geoforum.2013.12.004>
- 576 Enticott, G., Donaldson, A., Lowe, P., Power, M., Proctor, A., & Wilkinson, K. (2011). The changing  
577 role of veterinary expertise in the food chain. *Philosophical Transactions of the Royal Society of  
578 London. Series B, Biological Sciences*, 366(1573), 1955–1965.  
579 <https://doi.org/10.1098/rstb.2010.0408>
- 580 Escobar, M. P., & Demeritt, D. (2017). Paperwork and the decoupling of audit and animal welfare :  
581 The challenges of materiality for better regulation, 35(1), 169–190.  
582 <https://doi.org/10.1177/0263774X16646771>
- 583 Fielding, K. S., Terry, D. J., Masser, B. M., & Hogg, M. A. (2008). Integrating social identity theory and  
584 the theory of planned behaviour to explain decisions to engage in sustainable agricultural  
585 practices. *British Journal of Social Psychology*, 47, 23–48.  
586 <https://doi.org/10.1348/014466607X206792>
- 587 Fisher, R. (2013). ‘A gentleman’s handshake’: The role of social capital and trust in transforming  
588 information into usable knowledge. *Journal of Rural Studies*, 31, 13–22.  
589 <https://doi.org/10.1016/j.jrurstud.2013.02.006>
- 590 Flanigan, S., & Sutherland, L. A. (2016). Buying Access to Social Capital? From Collaboration to  
591 Service Provision in an Agricultural Co-operative. *Sociologia Ruralis*, 56(4), 471–490.  
592 <https://doi.org/10.1111/soru.12092>
- 593 Gray, J. (1998). Family Farms in the Scottish Borders : a Practical Definition by Hill Sheep Farmers.  
594 *Journal of Rural Studies*, 14(3), 341–356.
- 595 Gunn, G. J., Heffernan, C., Hall, M., McLeod, a., & Hovi, M. (2008). Measuring and comparing  
596 constraints to improved biosecurity amongst GB farmers, veterinarians and the auxiliary  
597 industries. *Preventive Veterinary Medicine*, 84, 310–323.  
598 <https://doi.org/10.1016/j.prevetmed.2007.12.003>
- 599 Haggerty, J., Campbell, H., & Morris, C. (2009). Keeping the stress off the sheep? Agricultural  
600 intensification, neoliberalism, and “good” farming in New Zealand. *Geoforum*, 40(5), 767–777.  
601 <https://doi.org/10.1016/j.geoforum.2008.12.003>
- 602 Hall, J., & Wapenaar, W. (2012). Opinions and practices of veterinarians and dairy farmers towards  
603 herd health management in the UK. *Veterinary Record*, 170(January), 441–441.  
604 <https://doi.org/10.1136/vr.100318>
- 605 Hansen, P. (2014). Becoming bovine: Mechanics and metamorphosis in Hokkaido’s animal-human-  
606 machine. *Journal of Rural Studies*, 33, 119–130. <https://doi.org/10.1016/j.jrurstud.2013.02.001>

- 607 Heffernan, C., Nielsen, L., Thomson, K., & Gunn, G. (2008). An exploration of the drivers to bio-  
608 security collective action among a sample of UK cattle and sheep farmers. *Preventive*  
609 *Veterinary Medicine*, *87*, 358–372. <https://doi.org/10.1016/j.prevetmed.2008.05.007>
- 610 Higgins, V., Bryant, M., Hernandez-Jover, M., Rast, L., & Mcshane, C. (2016). Devolved Responsibility  
611 and On-Farm Biosecurity: Practices of Biosecure Farming Care in Livestock Production, *0(0)*.  
612 <https://doi.org/10.1111/soru.12155>
- 613 Holt, L. (2008). Embodied social capital and geographic perspectives: performing the habitus.  
614 *Progress*, *32(2)*, 227–246.
- 615 Ingram, J., Mills, J., Dibari, C., Ferrise, R., Bahadur, B., Grønbech, J., ... Berta, S. (2016).  
616 Communicating soil carbon science to farmers : Incorporating credibility, salience and  
617 legitimacy. *Journal of Rural Studies*, *48*, 115–128.  
618 <https://doi.org/10.1016/j.jrurstud.2016.10.005>
- 619 Kaler, J., & Green, L. E. (2013). Sheep farmer opinions on the current and future role of veterinarians  
620 in flock health management on sheep farms: A qualitative study. *Preventive Veterinary*  
621 *Medicine*, *112(3–4)*, 370–377. <https://doi.org/10.1016/j.prevetmed.2013.09.009>
- 622 Law, J. (2006). Disaster in agriculture: or foot and mouth mobilities. *Environment and Planning A*,  
623 *38(2)*, 227–239. <https://doi.org/10.1068/a37273>
- 624 Law, J. (2008). Care and Killing: Tensions in Veterinary Practice. In A. Mol, I. Moser, & P. Jeannette  
625 (Eds.), *Care in Practice: on tinkering in clinics, homes and farms*. Bielefeld: Transcript  
626 Publishers.
- 627 Law, J., & Mol, A. (2011). Veterinary Realities: What is Foot and Mouth Disease? *Sociologia Ruralis*,  
628 *51(1)*, 1–16. <https://doi.org/10.1111/j.1467-9523.2010.00520.x>
- 629 Lowe, P. (2009). *Unlocking potential: A report on veterinary expertise in food animal production* (Vol.  
630 25). London. Retrieved from  
631 <http://archive.defra.gov.uk/foodfarm/policy/animalhealth/vservices/pdf/lowe-vets090806.pdf>
- 632 Naylor, R., & Courtney, P. (2014). Exploring the social context of risk perception and behaviour:  
633 Farmers' response to bovine tuberculosis. *Geoforum*, *57*, 48–56.  
634 <https://doi.org/10.1016/j.geoforum.2014.08.011>
- 635 Naylor, R., Hamilton-Webb, A., Little, R., & Maye, D. (2016). The “Good Farmer”: Farmer Identities  
636 and the Control of Exotic Livestock Disease in England. *Sociologia Ruralis*, *0(0)*.  
637 <https://doi.org/10.1111/soru.12127>
- 638 Nerlich, B., & Wright, N. (2006). Biosecurity and insecurity: The interaction between policy and ritual  
639 during the foot and mouth crisis. *Environmental Values*, *15(2006)*, 441–462.  
640 <https://doi.org/10.3197/096327106779116168>
- 641 Orpin, P., & Sibley, D. (2014). Predict and prevent versus test and treat. *Veterinary Record*, *174*, 403–  
642 406. <https://doi.org/10.1136/vr.g2749>
- 643 Perrow, C. (1999). *Normal accidents: Living with high-risk technologies*. New York: Basic Books.
- 644 Prager, K., Creaney, R., & Lorenzo-Arribas, A. (2017). Criteria for a system level evaluation of farm  
645 advisory services. *Land Use Policy*, *61*, 86–98.

- 646 <https://doi.org/10.1016/j.landusepol.2016.11.003>
- 647 Pritchard, K., Wapenaar, W., & Brennan, M. L. (2015). Cattle veterinarians' awareness and  
648 understanding of biosecurity. *Veterinary Record*, *176*, 546–548.  
649 <https://doi.org/10.1136/vr.102899>
- 650 Reay, D. (2004). 'It's all becoming a habitus': beyond the habitual use of habitus in educational  
651 research. *British Journal of Sociology of Education*, *25*(4), 431–444.  
652 <https://doi.org/10.1080/0142569042000236934>
- 653 Ruston, A., Shortall, O., Green, M., Brennan, M., Wapenaar, W., & Kaler, J. (2016). Challenges facing  
654 the farm animal veterinary profession in England: A qualitative study of veterinarians'  
655 perceptions and responses. *Preventive Veterinary Medicine*, *127*, 84–93.  
656 <https://doi.org/10.1016/j.prevetmed.2016.03.008>
- 657 Sibley, R. (2010). Biosecurity in the dairy herd. *In Practice*, *32*(7), 274–280.  
658 <https://doi.org/10.1136/inp.c3913>
- 659 Sutherland, L. A. (2013). Can organic farmers be “good farmers”? Adding the “taste of necessity” to  
660 the conventionalization debate. *Agriculture and Human Values*, *30*(3), 429–441.  
661 <https://doi.org/10.1007/s10460-013-9424-z>
- 662 Sutherland, L. A., & Burton, R. J. F. (2011). Good farmers, good neighbours? The role of cultural  
663 capital in social capital development in a Scottish farming community. *Sociologia Ruralis*, *51*(3),  
664 238–255. <https://doi.org/10.1111/j.1467-9523.2011.00536.x>
- 665 Sutherland, L. A., Burton, R. J. F., Ingram, J., Blackstock, K., Slee, B., & Gotts, N. (2012). Triggering  
666 change: Towards a conceptualisation of major change processes in farm decision-making.  
667 *Journal of Environmental Management*, *104*, 142–151.  
668 <https://doi.org/10.1016/j.jenvman.2012.03.013>
- 669 Sutherland, L. A., & Darnhofer, I. (2012). Of organic farmers and “good farmers”: Changing habitus in  
670 rural England. *Journal of Rural Studies*, *28*(3), 232–240.  
671 <https://doi.org/10.1016/j.jrurstud.2012.03.003>
- 672 Sutherland, L. A., Mills, J., Ingram, J., Burton, R. J. F., Dwyer, J., & Blackstock, K. (2013). Considering  
673 the source: Commercialisation and trust in agri-environmental information and advisory  
674 services in England. *Journal of Environmental Management*, *118*, 96–105.  
675 <https://doi.org/10.1016/j.jenvman.2012.12.020>
- 676 The Andersons Centre. (2013). *The structure of the GB dairy farming industry – what drives change ?*  
677 *The structure of the GB dairy farming industry - what drives change?* Kenilworth. Retrieved  
678 from <https://dairy.ahdb.org.uk/resources-library/market-information/industry-structure/the-structure-of-the-gb-dairy-farming-industry-what-drives-change/#.WMKWEPLgaZY>  
679
- 680 Van der Leek, M. L. (2015). Beyond traditional dairy veterinary services: “It”s not just about the  
681 cows!. *Journal of the South African Veterinary Association*, *86*(1), 1–10.  
682 <https://doi.org/10.4102/jsava.v86i1.1221>
- 683 Wilkie, R. (2005). Sentient commodities and productive paradoxes: The ambiguous nature of human-  
684 livestock relations in Northeast Scotland. *Journal of Rural Studies*, *21*(2), 213–230.  
685 <https://doi.org/10.1016/j.jrurstud.2004.10.002>

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<sup>i</sup> Higgins et al. (2016) assert that there is less of a disconnect than is claimed; they compare the practices Australian cattle farmers report carrying out with biosecurity guidelines and assert that farmers are adhering more closely to biosecurity guidelines than is generally claimed. However their findings are based on a small sample of qualitative interviews, and could not be taken as representative of all farmers, and are based on the farmers’ self-reporting of practices.

<sup>ii</sup> In this paper the term “intensive” agriculture is used to refer to systems with high levels of inputs and outputs per unit of land (Cambridge Dictionary, 2017).

<sup>iii</sup> An oral fluid pump is a device used to insert liquids into a cows’ stomach. It can be used to administer liquid medications.

<sup>iv</sup> Johne’s is a chronic and degenerative livestock disease.

<sup>v</sup> A naïve herd is a disease free herd. This may refer to all endemic diseases or a herd might be “naïve” in relation to a particular disease.