True cowmen and commercial farmers: Exploring vets' and dairy farmers' contrasting views of 'good farming' in relation to biosecurity

Abstract

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

Introduction

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

Similarly to dairy sectors in other developed countries, cost increases, fluctuating milk prices, removal of production subsidies and lack of farmer succession have led to a dramatic decline in the number of UK dairy farms – from over 30,000 in 1995 to just over 13,000 in 2015 (The Andersons Centre, 2013). These challenges to the dairy sector have had knock on impacts on the farm animal veterinary profession in the UK with fewer dairy farm clients and a reduced demand for veterinary services among those which remain, as farmers adjust to economic pressures (Lowe, 2009). The farm animal veterinary profession has also been impacted upon by its reduced role within government (Enticott et al., 2011), and competition for advisory services from nutritionists and consultants (Ruston et al., 2016). The farm animal veterinary profession is trying to move from the "test and treat" model of curing individual sick cows to a "predict and prevent" model where they act as disease prevention consultants on farm (Atkinson, 2010; Lowe, 2009; Orpin & Sibley, 2014; Van der Leek, 2015). While the veterinary profession has at other times in its history attempted to move to a preventive model of health intervention (Woods, 2013), a preventive approach is currently seen as ensuring the finance viability of the profession and improve the health and productivity of farm animals in the UK (Lowe, 2009).

Research on the influence of external actors on farmers has shown that farmers are likely to be influenced by advisors if their advisors' input is considered to be credible, salient and the actors to have legitimacy (Eastwood et al., 2017; Ingram et al., 2016; Prager et al., 2017; Sutherland et al., 2013). The use of psycho-social models such as theory of planned behaviour and social identity theory shows that farmers are more likely to be influenced by "in group" members rather than "out group" members such as urban populations (Fielding et al., 2008). Studies have shown that farmers use their vet as their primary source of information and advice on animal health (Garforth et al.,

2013; Gunn et al., 2008) and that there is a high level of trust between vets and farmers (Ruston et al., 2016). Vets can be seen to have a hybrid identity as in and out group members, connected to the farming community, but also outside of it which makes them ideal interpreters and translators of farming policy and biosecurity objectives to farmers (Enticott, 2012). However, there are also tensions and challenges within the vet-farmer relationship. Vets express frustration that they cannot interact with farmers enough to improve biosecurity, farmers do not take their advice, and biosecurity should be a greater priority for the dairy sector (Shortall et al., 2016). Vets can have different roles within government, industry and private practice (Escobar & Demeritt, 2017); this paper focuses on the vet-farmer relationship within private practice.

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

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

Conceptualising 'good farming'

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

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

The field within which a habitus develops is conceptualised as a competitive arena where people vie for different kinds of capital. According to Bourdieu (1986) capital is accumulated through labour and comes in the form of economic capital – material and financial property; social capital – networks of connection with other people; and cultural capital – signs of prestige and status. Cultural capital can exist in different forms: in institutionalised form such as educational

qualifications, in objectified form of high status goods, and in embodied form in skills and mental dispositions acquired over time which are visible to others (Bourdieu, 1986). Critically, these types of capital are exchangeable to various degrees – economic capital can be exchanged for cultural or social capital (e.g. utilised to develop skills or gain access to particular social groups). Capital acts as a conservative force in the world; capital has the potential to produce profits and to reproduce itself, meaning that not all outcomes are equally likely in the social world – those with capital are likely to produce more capital, those without must invest more labour to produce capital (Bourdieu, 1986).

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

Good farming and biosecurity

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

The changing 'rules of the game' addressed here primarily relate to economic duress and intensification. Wilkie (2005) argues that the role and importance of the stock keeper has changed with the industrialisation and intensification of agriculture; larger herd sizes mean that farmers may not be able to get to know their animals individually. The result is a change from "husbandry to industry" (Wilkie, 2005 p.216). This change has been highlighted in recent literature on

mechanisation: Butler & Holloway (2015) showed how adopting automatic milking systems could change the farmer's understanding of good farming, with practices of judging animals by eye being partly or wholly replaced with the use of data to monitor health and wellbeing. Naylor et al. (2016) found understandings of good farming divided along the same lines in different sectors. In poultry and pig systems good farming consists of monitoring certain key performance indicators such as mortality rates and water intake, whereas in the cattle and sheep sectors good farming was identified as tacit skills and knowledge that allowed farmers to assess health and welfare by eye. Hansen (2014) shows how mechanised dairy production systems mean that workers need not have skill or experience working with animals. Haggerty et al. (2009) also found tensions within the notion of good farming in pastoral sheep production in New Zealand, with progressive ideas of intensifying production through increasing stocking density conflicting with some farmers' traditional views of caring for sheep to ensure their health and welfare.

Differing views of good farming between the different livestock systems mean that the dairy sector in the UK is a particularly useful arena in which to explore notions of good farming, as it can still be seen as a diverse sector: the changing rules of the game have led to average farm size increasing and increases in intensity[i]. However the sector is still made up of a variety of production systems and ownership structures as farmers have responded in different ways to the changing rules of the game (The Andersons Centre, 2013).

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

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

Methods

Qualitative interviews were carried out with 28 farm animal vets and 15 of their farmer clients in 2014. Purposive sampling was used to access a range of different views on biosecurity (Bryman, 2001). Vets from practices with a Royal College of Veterinary Surgeons (RCVS) farm animal accreditation were chosen. The RCVS are the statutory body that regulate the vet profession. Farm animal accreditation is a voluntary scheme which sets and assesses standards for vet practices in relation to provision of farm animal veterinary services. We contend that practices, and the vets working for them, which were proactive and obtained this accreditation, would have an interest in and knowledge of farm animal biosecurity. In order to gain access to farmer interviewees and explore the vet-farmer relationship, a number of vets were asked to suggest two farmers for interview: one that they thought of as a good farmer for the purposes of biosecurity and one that

they thought was not as good. Demographic details of the interviewees are shown in table 1. The interviewees have been given a pseudonym in the results below, with the letter 'F' for farmer or 'V' for vet following their name.

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

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

Cultural capital of the good stock keeper farmer habitus

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cultural and economic capital of the large, commercial farmer habitus

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

Linda (v): We've already gone through the downsizing of the dairy industry around here. The ones that are here are in it to stay and they've invested heavily in it but because of that they've

upped their management and they're quite in control of what they're doing so there's less for us to do.

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

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

William (v) describes vets' role in disease prevention:

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

When asked why there is now a preventive approach to animal disease and if it was not needed in the past, vet Jim replies:

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

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

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

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

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

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

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

Interviewer: Is there any reason for the increase [in disease prevalence] do you think?
Frank (v): Undoubtedly, more movements of cattle around this country because there aren't the local economies that there used to be, that's probably it. […] When I have a client looking for replacements, he's often got to go a lot further away and out of the area. And some of these diseases are, like Johnes[iii], it's a lot more widespread than it used to be and it's very difficult sometimes to know that a place might have it, if you're not looking for it.

Here the reference scale for good farming for biosecurity was widened from the individual farm to the dairy sector and the consolidation of farms is not seen as good for the biosecurity of the sector as a whole. The industry-wide risk of a more mobile livestock industry was described in a report on the emergence of foot and mouth disease where it was stated that scale of livestock movements took people in the farming industry by surprise following the outbreak (Anderson, 2002) and has been analysed as a 'normal accident' (Perrow, 1999) waiting to happen in such a complex system (Law, 2006). Measures such as greater tracking of animal movements have been put in place to mitigate these risks (Duckett, 2014), but traded animals are imbued with risks. At the same time, there is considerable prestige in purchasing high quality livestock – the cultural capital associated with correctly identifying high quality animals, and the explicit display of economic capital in the purchase price. The good farmer as profitable farmer is evident in the transaction. This is explored further in the social capital section.

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

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

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

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

The social capital costs of biosecurity for the good stock keeper habitus

Social capital in farming consists of webs of social networks and relations of mutual obligation built up over time (Sutherland & Burton, 2011). Social capital is seen as important for rural development, contributing to economic capital and making farmers more resilient in the face of disease threats (Naylor & Courtney, 2014). Acts of maintaining social capital with other farmers were seen by the vets as examples of the traditional farmer habitus and incompatible with good biosecurity, as social interaction also brings the risk of disease transmission (Nerlich & Wright, 2006). Similarly to assessing disease status visually, an animal's disease status was also assessed by farmers based on social ties with the animal's owner. Some vets deplored this practice and called for rigorous, test based methods of disease assessment.

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

Livestock markets where farmers come together to buy and sell animals were seen by vets as a key example of farmers' sociability conflicting with good biosecurity.

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

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

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

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

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

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

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

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

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

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

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

Formation of social capital between commercial farmers and vets

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

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

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

Discussion and conclusion

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

This study accords with Naylor et al.'s (2016) findings of three good farmer ideals in relation to biosecurity of stock keeping skills and care for the animals; being a good neighbour and not causing biosecurity problems for the sector; and the good public facing farmer who has a good reputation for biosecurity. This study elaborates on those findings by showing the contested nature of stock keeping skills as part of good farming, and the different interpretations of what it means to be a

responsible neighbour and public facing farmer who does not create risks for the sector. Risk is constructed in different ways in relation to the types of capital held by the good stock keeper and the commercial farmer. According to vets who value the commercial farmer habitus, stock keeping practices of judging an animal by eye, basing buying in decision on social connections with farmers, and socialising with other farmers in an agricultural context are risky practices which allow the spread of disease. On the other hand, some farmers and vets frame the commercial farmer habitus with increased milk production that compromise the cow's immune system, leading to greater animal movement through buying in animals and consolidating the sector within regions and on large farms as increasing the disease risks the sector faces.

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

By emphasising the preventative veterinary model as ideal, veterinarians implicitly devalue the husbandry skills of farmers. The idea of good biosecurity as embodied by the commercial farmer habitus does not recognise the farmers' embodied skill and biosecurity practices of care for animals (Higgins et al., 2016). This may explain the view described in the introduction within veterinary epidemiology literature that improvements in biosecurity is required in the dairy sector (Brennan & Christley, 2013; Cook, 2013). In vets' accounts of good biosecurity, farmers who sweep away all the complicated social norms and social relationships around animal disease are good farmers. But this requires a significant cost for farmers. Their identity as good stock keepers or their skills in assessing animals and judging disease by eye are not recognised, they have to forgo social contact in a farming context at events such as livestock markets and they have to renegotiate social relationships with other farmers to discuss the difficult subject of animal disease.

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

According to vets, the farmers' pre-existing cultural capital of business skills may contribute to their development of a commercial farmer habitus. This is the case if for instance they are new entrants to the farming sector and bring these skills with them from outside the field of farming, as reported

by the vet Oliver. If these cultural capital business skills are activated, the process of change from the good stock keeper farmer habitus to the commercial farmer habitus is facilitated by a change in cultural and social capital.

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

The 'commercial farmer' and 'good stock keeper' constructions of good farming for biosecurity in the dairy sector draw on different assumptions and responses to the changing rules of the game. The rules of the game in the dairy sector in the UK are increasing the size and productivity of dairy farms, as well as the cows spending more time indoors (March et al., 2014), mirroring intensification in other countries with a developed agricultural sector (Hansen, 2014). More research could be undertaken on how other influential industry and government actors conceptualise good farming for biosecurity going forward. As the process of intensification of dairy farming continues, there is a danger that debates around biosecurity coalesce on the skills, social networks and economic capital of the commercial farmer habitus as good farming for biosecurity and the idea of the traditional stock keeper farmer habitus as a danger to biosecurity, ignoring the different ways risk is constructed in the two accounts of good farming.

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[i] 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).

[ii] An oral fluid pump is a device used to insert liquids into a cows' stomach. It can be used to administer liquid medications.

[iii] Johne's is a chronic and degenerative livestock disease.

[iv] 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.

[v] Though not all studies have found that animal disease is stigmatised and seen as a sign of bad farming. Farmers also stress the extent to which disease is outside of their control and the role luck plays in contracting disease (Enticott, 2008, 2016). This may depend on the nature of the disease and the context farmers are operating within. A detailed study of the conditions under which stigma is associated with disease is beyond the scope of this research, but within this study discussing animal disease was seen as having implications for farmers' social and cultural capital.