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Bridging the Divide between Theory and Practice: Taking a Co-Productive Approach to Vet-Farmer Relationships

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Abstract This article explores the practical difficulties faced by veterinary surgeons in bridging the divide between scientific and practitioner knowledge. By review of extant literature and an empirical example from the dairy industry, cattle lameness, the article advocates innovative approaches to the concept of knowledge transfer and suggests an alternative to the evidence-based communication model that many vets seek to use in practice. In highlighting a qualitative understanding of knowledge within a needs-based process of learning, the article suggests that co-produced experiences, framed by dialogic exchange and democratic learning techniques, have potential to bring together different forms of expertise in applied ways. The article contends that doing so carries the potential for greater collaboration, learning and change on farms.

Keywords Livestock animals · Applied ethics · Veterinary surgeons · Professional advice · Cattle lameness · Co-production · Knowledge · Learning · Change

Introduction

Farm animal veterinary surgeons occupy a unique and ambiguous position within the food production system. In attending to the health of individual and groups of farm animals, they must evaluate the needs, interests, desires of multiple stakeholders: farm animal ‘owners’ and their workers, buyers, producers and retailers and consumers. Veterinary work is underscored by a number of philosophical and practical issues, not least of which is the tension between care for the animal and safeguarding or increasing their productive capacities as food-producers or, indeed, as food. Many would view this as a paradox although many vets see health and optimum production as congruent. At the heart of veterinary professional deliberations, then, are deep and knotty questions of rights, interests and benefits for, as Tannenbaum

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(2010: 143) writes, ‘animals as well as humans often have legitimate interests and moral claims that flow from these interests’. The rights of humans and animals are intertwined, sometimes competing, and vets, working at the intersection of the theory-practice divide ‘face the difficult task of balancing animal and human interests’ as part of their professional skillset (ibid p. 143).

Clarke and Knights (2016) have pointed out that the vet takes a professional oath to support the care of the animal and yet in agricultural settings, it is the animal’s owner (or less contentiously, I suggest ‘keeper’) who pays for such care and stands to profit from its beneficial effects. Ethical debate of this has produced a large literature (for example, Miele 2016; Miele and Evans 2010) but in this article the focus is specifically upon the relationship between vets and animal keepers because in farming, animal health and productivity are closely linked. The aim is to think through the theory and practice of *co-creative methods of learning* across this particular professional/practitioner divide; something which has not been explored within this context to date. Indeed, formal veterinary training in negotiating on-farm relationships has been described as partial and inconsistent (Magalhães-Sant’Ana 2015; Richens et al. 2015) and despite concerted attempts to address this in veterinary pedagogy and research over the last couple of decades (for example, Legood 2000 and Klingborg 2011) veterinary surgeons have enjoyed limited interaction with humanities subjects where the nature of practitioner-client relationships have been more extensively and rigorously researched. The extant literature which does exist on veterinary-farmer relationships largely upholds the importance of *evidence-based communication* (Reyher 2016) at the cost of more nuanced, iterative and interactive understandings of knowledge creation which are now increasingly accepted and used elsewhere (Ostrom 1996). The central aim of this article is to address the shortage of research into veterinary-farmer relationships by proposing an alternative to the evidence-based approach.

In what follows, I highlight the advantages of co-creative methods for bridging the theory-practice divide and propose that re-framing the advice process as a dialogic exchange (Beech et al. 2010) encourages knowledge to be seen as an outcome of social relations and interactions rather than an objective artefact requiring ‘uptake’ (Foucault 1980). Hence learning is understood here as experiential and iterative (Dewey 1916, 1919, 1925, 1933, 1938) informed and shaped by the politics of the expert-practitioner divide. The article proceeds with a review of literature on veterinary relationships with farmers and then highlights some challenges to collaboration. It then moves to a brief empirical example – cattle lameness – and drawing further on literature from the veterinary and social sciences suggests how veterinary-farmer relationships, informed by a *needs-based* (rather than evidence-based) approach might be cultivated. I argue that co-created insights into animal health and wellbeing offer a practical way to manage learning and change and apply this to the case of bovine lameness by providing some brief examples before drawing final conclusions.

Bridging the Theory-Practice Divide

Those interested in agricultural, food and veterinary ethics often share a belief in the moral obligation to understand, alleviate, and prevent conditions that cause animal suffering within production processes (Emel and Neo 2015; Miele 2016; Noske 1997). Veterinary researchers have been at the forefront of this work for decades (Whay and Main 2009) and clinical

practitioners have tracked this literature to inform their work on farm. Indeed, the relationship between ‘formal science’ and on-farm practice is the focus of a growing literature (Richens et al. 2015). Phillipson et al. (2016) suggest that a blend of academic and practitioner expertise is essential to ensure the best quality advice and Enticott (2011) argues that veterinary surgeons are particularly well placed to apply and blend formal and informal knowledge to manage these concerns practically. Among others, Enticott (ibid., 2011; Hobson West and Timmons 2015; Phillipson et al. 2016) points out that the trusting and sociable relationships that vets often cultivate with animal keepers are of vital importance in effecting meaningful change for animals. Yet it remains a persistent theme in both the professional and academic veterinary literature that that there is significantly more which could be done to ensure good levels of ‘compliance’ by animal keepers with clinical advice that draws upon established findings of academic research (Atkinson 2010b; Richens et al. 2015; Whay and Main 2009). This aspiration emerges from a desire to make genuine improvements to farm animal health.

Making farmer-vet relations increasingly complex, however, is the social, political and economic context in which they interact. In Europe, for example, there is an increasingly intricate regulatory framework surrounding agricultural food production (for example in the use of pesticides and in waste disposal) which has contributed to a diversification of the economic base of rural areas away from primary commodity production and animal husbandry towards environmental protection and stewardship (see, for example, Emery 2014; Emery and Carrithers 2016; Phillipson et al. 2016). Hence, animal keepers must now consider a variety of factors in their everyday decisions, including the preservation of plants and wildlife species alongside their own livestock. Despite some gaps in the regulation (see, for example, Richens et al. 2015) many animal keepers increasingly operate in a constrained way, maintaining various new forms of data and paperwork (such as animal movement and identification records), and managing numerous official quality and compliance inspections (Defra 2011). Farmers are ‘more rule-bound in their procedures and processes’ than previous generations (Phillipson et al. 2016: 321). Vets are required to understand these pressures in context of everyday farm operations, decision-making and animal care. They must also respect the possibility that such ‘burdens’, combined with economic factors such as fluctuating costs and revenues, have a major effect upon the ease with which veterinary advice can be implemented, however worthwhile or important from a clinical or scientific perspective.

In a European context, veterinary services have changed markedly in recent years. Phillipson et al. (2016) argue that animal keepers are more demanding of specialised technical knowledge and skills than their forebears and veterinary surgeons increasingly compete with other on-farm advisers (feed consultants, milking machine engineers, crop advisers and so on) to offer various services, including pharmaceutical sales (Barabas 2013). Certainly, many tasks that would traditionally have fallen to vets during routine visits are increasingly carried out by animal keepers or technicians so that foot trimming, ‘disbudding’ calves’ horns, administering calcium to ‘downer cows’, giving injectable medicines and pregnancy diagnosis/ ultrasound scanning are no longer an exclusively veterinary job. Veterinary surgeons have responded by differentiating their specialised knowledge from that of their competitors (Atkinson 2010a) and by stressing the quality and independence of their services (Enticott 2011; Hobson West and Timmons 2015). The commercial pressure upon the veterinary profession has sharpened its sensibilities to the value of professional advice which, at least partly, explains the continuing belief among vets that *good science is the basis of good advice* and that their surgical and medical expertise forms one of their key ‘selling points’.

Some academics (e.g. Phillipson et al. 2016) have advocated inter-professional collaboration, claiming that expert-expert interactions reduce the need for ‘credentialism’ as a means to shore up monopolies of professional practice. Within the veterinary profession, however, the emphasis remains firmly on vets to be ‘sophisticated and effective communicators’ (Atkinson 2010a:114 and 2010b), exemplary experts and leaders in their interactions with animal keepers (Clarke and Knights 2016). Despite the theoretical attractiveness of teamwork between differently qualified ‘experts’, collaboration on farm animal health and welfare problems is limited by the driving force of commercial rationality; that is, the aim of many (perhaps most) vets to generate sustainable incomes from livestock care by offering specialist advice and having it applied on farm. In seeking to promote their unique service as a ‘bridge’ between science and practical animal husbandry, it is unsurprising that vets continue to be influenced by evidence-based communication (Reyher 2016) which stipulates that on-farm advice is more powerful, valuable and impactful when it is scientifically rigorous. In Reyher’s (2016) research on bovine mastitis, for example, vets are urged to highlight scientific facts on mastitis epidemiology in farm-specific advice to animal keepers to provide scientifically informed interventions that drive up milk yield and quality and, thereby, effect farmer satisfaction with the advice received and paid for (Hogeveen and Lam 2011). This approach to knowledge epitomises the profession’s desire to produce practical benefits for livestock animals and their keepers by interpreting and presenting research for ‘consumption’ by farmers, something which has been complimented by the recent development of technological applications such as the @Risk dairy farm decision tool (Bewley et al. 2010).

The main weakness of the evidence-based approach, however, is that it treats knowledge as an artefact which can be ‘impacted’ upon an animal keeper to bring about change. This is not only unsophisticated but inadequate if the aim is to make a genuine difference to animal health and welfare. Qualitative research among farmers (see for example, Emery and Carrithers 2016; Enticott 2011) and vets (Hamilton 2013) has shown that the scientific content of veterinary advice is but one of many pragmatic concerns in the life-world of animal keepers. Wallman (1979) showed how “the task of meeting obligations, securing identity, status and structure, are as fundamental to livelihood as bread and shelter” (Wallman 1979, p. 7). Several have explored, through in-depth engagement with animal keepers, the ways in which agricultural work exceeds a simple exchange between income and effort (Baldamus 1967; Gray 1998) and forms a human ‘identity investment’ resting upon processes through which complex cultural and ideological values are developed, enacted and made powerful (Evans 2013; Emery and Carrithers 2016; Ravetz 2001; Gray 1998; Wallman 1979). A farm is a repository of value and meaning-making (Ingold 1984), only part of which is influenced by veterinary advice. Evans (2013) coins the term ‘farmyard science’ to capture the way that formal scientific knowledges are adapted, ‘twisted’ and tailored to everyday demands and how advice is manipulated to fit common-sense ways of doing things. Accepting the messy uncertainties of learning and practical change is key to re-conceptualising the relationship between veterinary theories and farming practice and doing so has the potential to offer new insights into the reasons why farmers occasionally fail to implement professional advice to continue with old ways of doing things.

My argument is that vets can enjoy greater rewards if they see knowledge as the outcome of a political process in which certain understandings become dominant as a result of competing, unpredictable social, cultural, economic factors (Foucault 1980; Hamilton and Taylor 2014). Inevitably, this involves an acceptance that social interactions are shot through with indeterminacy and unpredictability and that veterinary opinion is likely to be one of several overlapping/competing views. In some quarters, veterinary researchers have already begun

to accept this position and have explored interdisciplinary approaches (Lowe et al. 2013) to create a complex view of particular animal health problems (Penny et al. 2009). Whay and Main (2009, 2013), for example, have attempted to draw on qualitative methods alongside quantitative datasets to explore why veterinary advice often fails to effect change at the individual animal level while other veterinary projects have used marketing and communication literature to rethink communication styles (see, for example, Atkinson 2010b; Horseman et al. 2013; Kristensen and Enevoldsen 2008). To date, however, qualitative perspectives on knowledge have yet to be taken up by vets with any vigour. The profession remains mired by the illusory promises of the evidence-based mantra at the cost of broaching new approaches to service and relationship management.

I suggest that vets, like any advisers working at the theory-practice intersection, would benefit from considering the inter-connected nature of power/knowledge/advice and appreciate the knotty ‘wickedness’ of various farm-level problems (Law 2014). To take this step is to appreciate that some knowledges and behaviours are not easily changed through advice because knowledge is not a ‘product’ requiring discovery, communication and ‘uptake’; in fact, knowledge is not an artefact but rather a process entwined with subjective experience (Dewey 1925, 1933) embedded within political systems (Foucault 1980) and impacted by social variables (Lam et al. 2008; Lowe 2009; Penny et al. 2009). Knowledge is not the same as truth (Foucault 1980). There are *many* truths – veterinary epidemiology being just one – and farmer appreciations of what is true are tangled up with their ways of knowing (Mol and Law 1994), their everyday sense of what is right and what is useful (Evans 2013). From a vet’s viewpoint, one way of altering an individual’s subjective knowledge is through offering professional advice, but this is only one way in which people come to knowing. And knowing does not imply action or change. This is a key part of the ‘wickedness’ of a wicked problem (Law 2014), particularly when nonhuman animals are involved as they cannot advocate for themselves through language.

Nuanced conceptions of knowledge-making *as process* have the potential to reframe the vet-animal keeper relationship in more subtle and, therefore, influential ways. It enables the connection to be seen in less strategic, physicalistic terms, with compliance as the outcome of presented facts. By contrast, a genuine, interactive engagement carries the potential for long-lasting change through new knowledge. To illustrate this proposition in ‘real world’ terms, the article now turns to an empirical example: foot health and lameness in dairy cattle. The focus is on cattle lameness as opposed to another health problem because, firstly, as a condition that affects animal health and wellbeing, there are clear ethical implications in aiming to reduce suffering as a result of lameness (Bicalho 2011). Second, lameness affects productivity (milk yield) and farm incomes which means it is important from a commercial animal keeper’s point of view. Thirdly, as one of the most significant and persistent husbandry problems in contemporary dairy farming (Randall et al. 2015) lameness is a useful example of a ‘wicked’ problem (Law 2014) because vets continue to grapple with it.

Lameness: A Wicked Problem

Veterinary surgeons usually define lameness as “any abnormality which causes a cow to change the way that she walks” (DairyCo 2014). It can be caused by a range of foot and leg conditions (for example bruising, sores and cuts), themselves caused by disease, management or environmental factors. As Randall et al. (2015) put it, “Lameness in dairy cows is a

multifactorial and progressive disease with complex interactions between risk factors contributing to its occurrence” (2015: 3766). Studies in the veterinary sciences have pointed to a significant relationship between lameness in dairy cattle and human management practises such as foot-trimming (see Maxwell et al. 2015) on the farm. For example, Whay and Main (2013) argue that cattle herds, if allowed to walk freely (that is, without being herded, rushed or driven) will suffer fewer cases of lameness. While further studies are still needed to better understand some of the causes and clinical aspects of cattle lameness, wide literatures on lameness in context of feed, genetics, bedding and housing are already available that have value for treating and preventing lameness incidence and prevalence at a farm level. Using this literature, for example, Bell et al. (2009) have developed an assessment approach that promotes the development of action plans based on farm-specific risk factors. An important question that has yet to be answered by lameness research teams, however, is how to support vets in communicating with animal keepers so that they can make a genuine impact upon cattle well-being; that is, to give lameness action plans more power. The issue of ‘non-compliance’ with advice has already been researched within the veterinary literature without simple solutions although, helpfully, Whay and Main (2013) have suggested that animal keepers are occasionally resistant to change because they are tethered to the embodied routines and practises that they have traditionally relied upon and pressured further by time and economic factors. Though veterinary advice to farmers on how to reduce lameness may well be based upon large and rigorously collected datasets, it has already been demonstrated that, faced with a proliferation of advice and often short of time and/or motivation for change, many of them will inevitably continue with techniques of husbandry that fail to improve lameness problems (Whay and Main 2013: 240).

For vets, charged with the responsibility of interpreting science for animal keepers driving genuine change is, therefore, difficult. Vets take the burden upon themselves to be exemplary leaders, communicators and managers and to *solve problems* by forging connections between ‘expert’ and ‘common sense’ ways of doing things. Yet the professional time and care that goes into crafting a risk assessment and action plan, for example, is wasted if the resultant document goes unread or is considered important but not urgent. Hence, the persistent problem remains: How can vets effect meaningful change in the lives of the animals afflicted by lameness? Are action plans still the ‘best bet’ for communicating knowledge and making it practically useful? And, if so, why do some farmers and their operatives persist with ineffectual ways of managing lameness? Does the persistence of poor foot health management constitute a form of *service failure* on the part of the vet? These questions are living ethical dilemmas, not least because lameness is so debilitating and painful for dairy cattle who do not speak to make demands for themselves.

In raising these questions, I am not suggesting that vets should do away with action plans or advice informed by scientific findings, but I am arguing that a broader appreciation of the open-ended and uncertain nature of the learning and change process would help vets consider new strategies on farm. It is not the case that better science leads to better learning and that this inevitably leads to change. This model of learning and transformation is misleading and, in the next section, I suggest that a *needs-based approach* to knowledge offers a realistic shift of focus, one which stresses the subjective and embodied experience of the ‘learner’ instead of the expertise of the ‘teacher’.

Knowledge for ‘Meeting the Need’

I propose that vets reduce their dependence upon evidence-based communication as the gold standard and instead reframe communication around the pragmatic needs of animal keepers. This is not to dismiss evidence-based techniques of communicating, such as action plans, out of hand rather it requires moving beyond the common assumption that the most persuasive facts and the ‘best science’ lead to satisfaction, learning and change. Marketing literature explores how those in client-facing roles aim to meet the subjective needs of their customers to engender loyalty (Chung-Herrera 2007; Payne and Frow 2005, Rosenbaum et al. 2005) and aspects of the needs-based approach are relatively straightforwardly applied to veterinary service provision. In practical terms this involves conscious and pragmatic acceptance that the needs of each farmer interaction may involve qualitative (perhaps even emotional) factors rather than narrow scientific knowledge, despite the fact that this is – ostensibly – what animal keepers are paying for when they call out the vet.

Whatever the farmer’s need, be it technical, practical or otherwise, my contention is that professional advice can make greater impact if conversations are tailored specifically to acknowledging and understanding that need. For instance, while it is tempting for vets to assume the primacy of financial concerns to commercial animal keepers and, thus, emphasise how much each case of lameness costs in treatment, many other considerations may be important such as carrying out a task in a quick and simple rather than cost-efficient way. Likewise, some farmers may be motivated by productive efficiency and place great value upon ‘benchmarking’ their own farm outputs against those of other farmers. Others may be motivated by values such as organic farming, environmental sustainability or curating/maintaining rare breed livestock and developing a legacy of genetic progeny for subsequent generations.

While the de-coding of subjective needs from a person’s words and behaviour is by no means a straightforward process, a qualitative rather than narrowly quantitative approach to services marketing is already commonplace across the spectrum of commercial sales although vets have distanced themselves from this. In adopting the language of ‘clients’, for example, vets have avoided the language of ‘customers’ just as they have disaggregated medicine sales from the more clinically informed language of ‘prescriptions’, ‘advice’ and ‘care’ (Hamilton 2013). In other words, the apparent discomfort with the sale of advice for financial gain has militated *against* a needs-based approach to veterinary communication while buttressing the myth of evidence-based communication as superior because it is based upon expertise. Rethinking the nature of expertise, however, is essential to moving away from a treatment of knowledge as object-like and physical - an artefact which can be transferred from expert to non-expert. I argue that new knowledge is best produced in collaboration, starting with dialogical exchange (Beech et al. 2010) in which the motivations and distinct knowledges of the other interactant are treated equally (Collins and Evans 2007). This places the emphasis on collaboration and co-produced knowledge rather than transactional *knowledge transfer*.

Many have started to take up the idea of knowledge co-production with enthusiasm over the last two decades (Beech et al. 2010; Pettigrew 2011; Ostrom 1996; Kelemen and Hamilton 2015; Kelemen et al. 2016) and its principles have been applied to leadership and decision-making as well as bridging the ‘relevance gap’ that persists between academic theory and practical application. Co-production departs from traditional models of information moving from expert to practitioner through advice by drawing on creative methods of teaching and learning (Gauntlett 2007) to reduce the effect of pervasive social hierarchies (Dewey 1916).

Facilitation techniques of mediating social interaction between academics and community members, for example, are currently being explored through craft and drama workshops (Antonacopoulou 2010; Beech et al. 2010; Carlsen et al. 2014; Ostrom 1996). Whatever technique is used, the aim is not to confront other peoples' opinions/knowledges directly but to devise innovative ways of interacting, often using material objects as mediation devices, to learn through experiences about each participant's beliefs, needs and aspirations in an empathetic and democratic manner (Dewey 1925). Importantly, the emphasis upon interrogating power imbalances (Foucault 1980) between common sense and expertise makes it particularly relevant to the current case.

There is much in this emerging field that benefits a needs-based approach to veterinary relationship management. Farmer participation in knowledge creation is vital to practical change that improves animal health and welfare in lived settings. It is critical for there to be participation in knowledge construction so that animal keepers feel they have a stake in and 'own' their expertise rather than relying upon paid-for but separate scientific and professional perspectives. After all, the legitimacy of action plans can be undermined and weakened if the voice of practitioners is absent from the planning process. Interestingly, this concept has gained ground recently in the human medical professions and there has been a conscious decision in some hospitals to use the terminology 'non-congruence' rather than the more loaded word 'non-compliance' when referring to patients who do not follow prescribed advice (see Brom et al. 2014). Active participation in knowledge-making is part of a 'more open and democratic process of knowledge production' (Brock and McGee 2002; Dewey 1925), resting on a shared 'thought style' (Pohl et al. 2010, 271) within a 'boundary space' which bridges different social worlds. In practical terms this means bringing veterinary and farmer worlds of thought together through discussion, idea sharing and practical experimentation.

Boundary spaces need to 'involve participation from actors from both sides of the boundary' (Pohl et al. 2010, 268) and hence, genuine co-production rests upon mutual respect for the validity of different forms of knowledge including common sense or 'farmyard science' (Evans 2013). Such a mutually respectful approach moves beyond discourse between expert and practitioner, service provider and service buyer, towards *collaborative transformation* where the purpose is to actively alter the conditions in which farmers and their animals live/work. In the context of bovine lameness, for example, vets question what the animal (or herd of animals) needs and this forms the basis of their treatment and advice. A needs-based approach necessitates a further question of the human actors; that is, what does the animal keeper require to meet the animal's need? What targets are achievable given their constraints upon available finances, space, time and so on?

Understanding what it will take for the animal keeper to change/improve their husbandry and to implement any advice by making practical changes requires a measure of qualitative analysis, for example, what keywords do animal keepers use about their values ('cost', 'ease', 'speed', 'time', 'welfare')? Identifying the way that the animal keeper values (or does not value) technical knowledge is vital to appreciating their learning style and motivation for change. Does the animal keeper benefit from 'doing' and experience? Are they more comfortable to learn through abstract or theoretical modelling, through discussion, iterative trial and error, visual techniques? Do they place value on scientific 'evidence' before making a change and if so what kind is likely to be persuasive? Are they likely to read and act upon a written document (such as an action plan) or are there opportunities to experiment with physical objects and materials? If as Why and Main (2013) have argued, for example, that cattle which are not driven by artificial means such as goads/prods and sticks suffer less

lameness, what practical changes could vets and farmers experiment with in facilitating freer forms of walking for cattle? Beyond a dialogic exchange about what is best for animals at the ideal level, would it be possible, as some have suggested (for example, Grandin 1989), to collaborate to re-design husbandry systems to assist animal handlers to do things differently? One experiment, for instance, might involve manipulating the animal's line of sight to encourage it to walk in a particular direction, reducing the requirement to be moved forcibly or at speed. Other experiments might involve reorganisation of housing space or bedding materials and constitute 'boundary spaces' because vets and animal keepers are coming together *across boundaries of expertise* to apply their own knowledges to designing and testing practical changes.

While many vets already use practical techniques of trial and error in their routine work (Clarke and Knights 2016), they are not currently doing so within a consciously needs-based, co-creative theoretical approach. Indeed, they often see experimental measures as a pragmatic but imperfect way to improve 'compliance'; a term redolent of a one-way transfer from knowing scientific professional subject to 'supposedly ignorant one' (Pohl et al. 2010, 217). Co-produced knowledge experiments, by contrast, seek to generate democratic collaboration with genuine potential for transformation because they address the subjective needs and motivations of those participating, be they economic, scientific, emotional or otherwise. On this basis, I regard co-produced knowledge as more likely to effect better learning outcomes for animal keepers by enabling them to develop *ownership* of new insights; understanding that starts from everyday ways of doing and thinking rather than formal science.

Advocates of co-creation have pointed to some notable successes in using this method to bring differently skilled people together to work on applied problems. Kelemen et al. (2016), for example, have demonstrated how their co-creative workshops in the field of human health challenged traditional norms of learning through knowledge transfer. They contend that there was freer communication across the academic/practitioner divide that encouraged contentious and potentially difficult themes to be explored in a hands-on way. They also describe the long-term networks that were forged on the basis of their co-production experiences. There are, however, some potential pitfalls and dilemmas which must be openly acknowledged. For example, some individuals will find the very idea of co-production unpalatable. There are likely to be individuals from both sides of the knowledge 'boundary' who prefer to work in more traditional, transactional ways and for such individuals, co-creation is unlikely to be helpful. A more pressing dilemma, however, relates to the nature of the commercial relationship between vet and animal keeper itself. The fact that vets charge for their services has necessitated a degree of epistemological 'protectionism' by shoring up the rights to define and legitimate knowledge which carries monetary value. The embedded knowledge hierarchies between veterinary and common-sense expertise are troubled by co-production and this may threaten the commercial prestige of vets as experts. The draw of the traditional evidence-based approach, for example, is that it is more easily translated into tangible financial 'value'. When farmers are encouraged to pay for a lameness action plan, foot medicine or treatment, for example, they are able to see a physical value in their purchase (be it effective or otherwise over the long term).

When learning and change is co-produced through experimentation, by contrast, the animal keeper may perceive less value in the vet's contribution and, thus, find it difficult to judge the cost and worth of that service. Hence, while co-production exercises and experiments may have realisable benefits in their pragmatic application, the question as to who is responsible for learning and change and, thereby, who should pay and how much is open to doubt. There are

no simple solutions to this conundrum. Yet the profession is well experienced in dealing with commercial threats to the perceived value of their services in a range of contexts from medicine provision (Barabas 2013) to a number of technical services such as foot trimming. The profession is well-equipped to respond to this challenge, particularly given the strong social ties that many vets cultivate to build trust and mutual regard (Enticott 2011; Hobson West and Timmons 2015).

Conclusion

Experiments in co-produced knowledge have the potential to translate shared learning experiences into genuine change with myriad applications in livestock-keeping, something which may shed new light on ‘wicked problems’ such as lameness that continue to trouble vets and farmers. In advocating different approaches to building democratic learning relationships between veterinary experts and animal keepers, I have sought to contribute new insights to both theoretical and practical possibilities for bridging the gap between theory and practice; that is, between formal and common-sense forms of knowledge about the care of animals on farms. In this regard, I have endeavoured to link applied ethics with practice to benefit those involved, be they human or animal. The article has drawn on a growing body of literature from veterinary science, management and the qualitative social sciences to show how communication between veterinary advisers and their clients can be re-framed as a process informed by both Foucauldian insights into knowledge/power as well as American pragmatist insights into learning as experiential, iterative and embodied. The aim has been to show why and to a lesser extent how veterinary professionals, working at the interface between scientists and animal keepers, would benefit from this distinctive theoretical framework. Drawing on a needs-based rather than a narrowly evidence-based approach, I have argued that vets can increase their potential for leaving a lasting on-farm legacy when encountering multi-faceted problems such as lameness. This does not imply the rejection of all traditional methods of giving advice (such as action plans) but it is important in my reading of the interactional nature of the vet-farmer relationship that these do not form the *only* means by which learning is managed. By offering these ideas in the context of a lived welfare problem, rather than addressing ethical concerns at a theoretical level, this article has aimed to highlight the pragmatic potential of this non-traditional approach.

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