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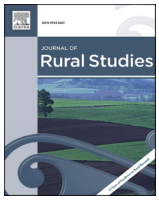

Lively commodities and endemic diseases: Shifting commodity situations and nonhuman disability in cattle and sheep on UK farms☆

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ABSTRACT

The concept of 'lively commodities' captures how aspects of the life of certain entities affect their commodification and exchange within capitalist economic systems. Their status as being, or comprised of, living things matters to their commodification in different ways in particular places and spaces and at particular times. This paper uses the empirical example of diseased farmed animals in the north of England to examine the effects of susceptibility to disease on the process of lively commodification, drawing on conceptualisations of nonhuman disability and relations of care alongside literature on lively commodities, and exploring cases of multi-lifeform co-production of disease. It thus focuses on moments where the liveliness of animals means that commodification 'goes wrong', because liveliness means susceptibility to injury and disease, alongside its potential for economic production. The paper focuses on two important endemic conditions affecting UK farming: lameness in cattle and sheep, and bovine viral diarrhoea (BVD) in cattle. These conditions significantly affect animals' welfare and impact on farm productivity. Drawing on qualitative analysis of transcripts from in-depth interviews with 29 farmers and 21 farm advisers (e.g. vets), the paper examines three empirical themes where farming practices are strongly affected by the lively nature of the commodities being produced: first, the anticipatory practice of breeding animals resistant or vulnerable to disease; second, lameness and nonhuman disability; and third, BVD and threats to agricultural biosecurity. The paper concludes by revisiting the concept of lively commodities in situations where farmed animals are diseased, and reflects on the implications of this for their shifting commodity status in particular times and places.

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1. Introduction

'Lively commodities' are those where something about their status as being, or being comprised of, living things matters to their commodification – that is, the process by which things become goods which can be bought or sold within capitalist systems of exchange. Lively commodities can thus be individual organisms or collectives such as ecosystems (Collard and Dempsey 2013). Writing about lively commodities has recently begun to explore how aspects of the life of certain kinds of 'thing' affect processes of their commodification and exchange within capitalist economic systems (Barua 2016, 2019; Collard & Dempsey 2013, 2017; Cseke 2023). In this paper, we engage with ideas about lively commodities, situated in a wider context of ideas about commodification and conceptions of value and the social life of things (Appadurai 1986; Kopytoff 1986; Lee 2006). Adding a novel dimension, we bring these ideas into conversation with other sets of ideas relating to understandings of human-nonhuman life (including debates about ethics and relations of care and the conceptualisation of disability), to explore the empirical example of diseased farmed nonhuman animals

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(henceforth animals) used for producing milk and meat on farms in the north of England. Farmed animals have been relatively neglected as examples of lively commodities, although they have been conceptualised in related ways (see below). Yet their commodification rests on their 'liveliness' – their ability to reproduce and grow for example – and as such they are important exemplars of the concept. In thinking about disease and disability in farmed animals, we particularly focus on moments where the liveliness of animals means that the commodification process 'goes wrong', because liveliness means susceptibility to injury and disease, alongside the potential for economic production. Specifically, we examine empirically two different exemplar endemic diseases – bovine viral diarrhoea (BVD) in cows and lameness in cows and sheep - because of the different perspectives these contrasting conditions can provide on farmed animals as problematically lively commodities. Focusing on these conditions extends the discussion of the liveliness of specific commodities to consider the hybrid liveliness involved in disease and nonhuman disability, where endemic disease is an effect of relationships between animal bodies and (for example, viral or bacterial) microorganisms in particular farmed places and spaces.

Presenting disease and injury as one (unwanted and problematic) dimension of the liveliness of farmed animals, existing in relation to other desired and actively fostered dimensions such as the ability to grow and reproduce, we are interested in how diseased farmed animals are discursively framed and related to in practice, on farms, by farmers and others (e.g. vets) who work with them. We explore how farmed animals are 'part-commodities', in the way that their identification as commodified 'things' only captures one aspect of their existence and value. The paper asks three questions. First, how do farm animal breeding practices aim to foster some aspects of the liveliness of farmed animals as part-commodities? This focuses on how their prospective exchange value necessarily sits alongside other systems of valuing animals' qualities, while seeking to anticipate and reduce the future risk of injury and disease. Second, what differences do different diseases and injuries make to the 'commodity situations' (Appadurai 1986) and to what we refer to as the 'commodity moments' in which farmed animals become, at least partially and perhaps temporarily, commodities? Third, with reference to ideas about care and nonhuman disability (Holloway et al. 2023b; Taylor 2017) what are the implications of conceptualising farmed animals as lively commodities? In exploring these questions, we are interested in this paper in how a lively commodities framing can inform attempts to address endemic diseases such as BVD and lameness in farmed animals.

The paper is set out as follows. First, we review writing on lively commodities, situating this in relation to ideas about commodities and their 'social lives' more widely. We expand on this work by developing a framework of ideas which relates the concept of lively commodities to writing on understandings of 'unsound bodies' (Gibbs 2021), nonhuman disability (Taylor 2017), and embodied care. Taking these ideas forward, we then outline our empirical case study, describing the aetiology and effects of BVD and lameness and outlining our methodological approach to studying their implications on farms in the north of England. We then examine three empirical areas which allow us to respond to the paper's research questions. We look first at the breeding of farmed animals as an anticipatory practice which involves attempts to foster some aspects of the liveliness of future individuals and populations while reducing the risk of the incidence of those aspects of the life of animals which are problematic. We then look in turn at our two exemplar endemic conditions, exploring how they are confronted on farms as part of the lively nature of entities which become part-commodities, at some moments, and in some places. In relation to lameness, we explore how animal bodies can be ill, injured or disabled, with effects for their ongoing growth as lively commodities and the realisation of their exchange value during commodity moments. In relation to BVD, we focus on how lively commodities can be infected and infectious and thus a threat to others. The paper concludes by revisiting the concept of lively commodities in situations where they are diseased, and reflects on the implications of this for their shifting commodity status in particular times and places.

2. Lively commodities and diseased farm animals: biographies, care and non-human disability

Commodities are things rendered for sale in a market, and have been the subject of detailed discussions focusing on their constitution and circulation in capitalist economies (e.g. Harvey 2018 [1982]). Commodities can be both seemingly obvious, and bewildering in the complexities of how they are produced and valued. As Lee (2006) emphasises, it is useful to see the economic geographies which are built on the production, exchange and consumption of commodities as in essence very ordinary and, crucially, as part of sets of the social relationships, discourses and practices which constitute particular spheres of activity. Much geographical research (e.g. Cook 2006) has drawn on the work of Appadurai (1986) who, in arguing that commodities have 'social lives', made a case for following them as they circulate, in order to develop understandings of the 'human transactions and calculations that enliven things' (p.5). For Appadurai, instead of trying to define in a simple way what kind of thing a commodity is, we should focus on what he termed 'commodity situations'. This terminology emphasises that it is the social relationships within which a thing exists that determines whether and how it is a commodity at any moment. Developing this idea, Kopytoff (1986) describes the way in which such things can be studied biographically. In the course of their biographies, things might move in and out of commodity situations, becoming commodities, or varying in the way that they are commodities, as part of different social relationships. Thus, a thing might be a commodity at some times (but not others), and for some people (but not others) (Kopytoff 1986). Geographically, it might similarly be a commodity in some places, but not others. Kopytoff thus raises a set of important questions to consider in tracing commodity biographies. As he asks, 'Where does the thing come from and who made it? What has been its career so far, and what do people consider to be an ideal career for such things? What are the recognised "ages" or periods in the thing's "life", and what are the cultural markers for them? How does the thing's use change with its age, and what happens when it reaches the end of its usefulness?' (pp.66-67).

Such questions are valuable in thinking about farmed animals, however their status as prospective commodities is complicated by their biological 'liveliness' which coexists with, and goes into the making of, the sociological life and relationships described by Appadurai and Kopytoff. Different approaches have been taken in writing on the problematics of seeing animals as commodities. Stuart and Gunderson (2020), for example, describe farmed animals as an example of extreme commodification, while also suggesting that such animals can also be seen as 'fictitious' commodities, in that they do not share the characteristics of a 'true' commodity because they are not simply created as products. Shukin (2009) instead asks how animals might become rendered as capital, and focuses on the biopolitics of 'entanglements of "animal" and "capital"' (p.7), in a Foucauldian perspective on the centring of power on the life of animals as individuals and populations (see also Asdal et al. 2016; Chrulew and Wadiwel 2017). Her approach is limited, however, in not taking into account animals' lively agency and subjectivity (Barua 2016). Negotiating these blurred boundaries surrounding efforts to determine the nature of farmed animals as commodities, others have explored their hybrid natures as both commodified and something else at the same time. Holloway (2001), for example, discussed smallholder farmers' ambiguous attitudes towards animals which could be viewed as simultaneously pets and products. Wilkie (2005, 2010) describes farmed animals as 'sentient commodities', writing that such animals ' … are atypical market commodities that have an ambiguous product status… ' (2010, p.123) because they are both traded as things and cared for in ways which demand an acknowledgement of their subjectivity and agency (see for example Bassi et al. 2019; Bock et al. 2007; Holloway et al. 2023b; Holloway et al.

2024). In these accounts, human-animal intersubjective relationships are an important part of the part-commodification of farmed animals, but also disrupt commodification processes.

Writing on the concept of lively commodities develops these ideas further. Lively commodities are 'entities whose biological life is central to their value as commodities' (Collard and Dempsey, 2017, p.75; see also Haraway, 2008). Living nonhuman entities such as animals can thus be part of the constitution of economic life (Barua, 2016). As Barua (2016, 2019) describes it, animals' contribution is a form of 'work' (Porcher 2006; Stuart et al. 2013), where animals' 'metabolic, ecological and affective labour become a productive economic force' (Barua 2019, p.650). However, while the living nature of such commodities is important to the production of the value of the entity as a commodity, for example through organic growth or reproduction, it can also present problems to the commodification process. This is because animals' bodies and capacities require specific conditions in order to generate value through growth and the 'work' they do (Barua, 2016), because animals' bodies and behaviours might be uncooperative and unpredictable (Barua 2019; Bear and Holloway 2019), and due to their vulnerabilities to health and disease issues. This latter point applies especially where conditions do not meet animals' biological and affective needs, as can be the case in much contemporary agriculture (Bellet et al. 2021; Stoddard and Hovorka 2019).

Similar points are raised by Schneider and Coghe in their discussion of how, at the frontiers of commodity making, commodifying animals is problematic. They identify 'the difficulty of rendering things that are alive into things that are stocked' (2021, i), describing how 'To be alive is biological; living things breathe, eat, defecate, move, sleep, grow, reproduce, connect with others, get sick, die. To be stock, on the other hand, is economic … In capitalist relations, specifically, livestock (and livestock parts) are owned, quantified, rationalized, commodified, specialized, simplified, contracted, accumulated, speculated upon, traded, sold' (2021, i). As they say, some aspects of the former present barriers to aspects of the latter, so that 'The rhythms and characteristics of [animal] lives and bodies do not easily align with capitalist demands for efficiency and standardisation' (2021, i), and the farming of animals is 'built on precarious biological foundations' (2021, iv). As Shukin (2009, p.16) similarly acknowledges, 'diseases erupting out of the closed loop of animal capital … are one material sign of how the immanent terrain of market life becomes susceptible, paradoxically, to the pandemic potential of 'nature' that early modern discourses of biopower originally sought to circumscribe'. Schneider and Coghe's, and Shukin's, descriptions of the biological qualities of living things which become commodified also point towards the importance of human-nonhuman co-production in (inter alia) capitalist farming. Ingold's (2000) description of this as processes of growing, rather than making, contrasts farming, as involving 'a productive dynamic that is immanent in the natural world itself' (p.81) with conventional understandings of how people create commodities. Related terminologies express this relationship in other ways: rearing, raising or nurturing, for example, are all deployed in relation to 'growing' animals. The lively part-commodities which (perhaps fleetingly) result are thus the co-authors of their becoming commodified, through either or both their embodied capacities (and limitations) and their subjectivity, agency and sentience.

The work of Collard and Dempsey (2013, 2017) and Barua (2016, 2019) provides a key set of ideas to take forward regarding lively commodities 'as *constitutive* elements of economic life' (Barua, 2016, p.726). Collard and Dempsey (2013) differentiate between individual animals as lively commodities whose value is in part expressed through an ability to 'encounter' those animals (see also Barua, 2016), and the collective or aggregate life associated, for example, with ecosystems. For the former, their value as lively commodities is dependent on their being alive, along with 'their "vital or generative" qualities that can produce capitalist value as long as they remain alive and/or promise future life' (p.2684, citing Parry, 2012). Individual animals' encounter value is linked to the possibility of sensual, tactile, 'face-to-face' relationships with them, although it is important to remain aware of the histories of domestication, and of relationships which can be exploitative and violent. These precede and make possible such encounters (see also Barua 2016; Barua 2019; Giraud 2019; Haraway 2008), and might also be resisted by nonhuman animals in various ways (see e.g. Barua, 2019; Bear and Holloway, 2019). In relation to aggregate lively commodities, value inheres in the idea of 'reproductive life' (Collard and Dempsey, 2013, p.2690), something that Collard and Dempsey describe in terms of a biopolitical focus on interventions in the size, composition and qualities of populations. For instance, there might be a focus on 'improving' a population of farmed animals (see also e.g. Holloway et al. 2009). In our case studies of endemic diseases of cattle and sheep, we argue that it is useful to be able to conceptualise such animals as both encounterable individuals with the capacity for one-to-one relationships with people, *and* as aggregate populations whose value inheres (in part) in a reproductive value that anticipates future individuals and populations seen in terms of a trajectory of continuous improvement and productive growth. This trajectory is often bound into a concept of breed, as an animal grouping that has genetic value, expressed in terms of a pedigree, and cultural and geographical meaning (Nash 2020).

Collard and Dempsey (2017, see their Table 1, p.79 for detail) identify a set of five 'orientations' of lively commodities in relation to capitalism and the production of value. Orientations, they argue, 'reflect positionings of bodies or communities of bodies in relation to capitalist social orders' (p.85), and thus persist over time while also subject to ongoing processes of change in capitalist societies. Lively commodities can thus be 'officially "valued"', members of a 'reserve army', part of 'the underground', seen as 'outcast surplus', or regarded as a 'threat'. Individual animals on farms, we suggest, can be seen in terms of more than one of these orientations simultaneously, and might move between orientations. Such movement could occur across time and space. In relation to our examples of endemic disease and farmed animals, three orientations are particularly pertinent. 'Officially "valued"' lively commodities include (healthy) farmed animals, where their value varies according to qualities including their species, breed and age. Organisms might be seen as a 'threat', where they endanger production. Collard and Dempsey suggest bacteria and viruses as such a threat, and we might also consider those animals infected with these microorganisms as themselves posing a threat to other individuals and populations, as well as to farm businesses. The orientation of 'threat' coincides with concepts of agricultural biosecurity (see e.g. Enticott 2008; Hinchliffe et al. 2016), the urge to anticipate and defend against threats to health and life (and thus to bodily and economic productivity on farms). The 'threat' orientation refers also to 'legally "injured" or damaged' (p.79) animals which carry a cost for those responsible. We might see this, for example, in terms of the costs of veterinary treatment for lame animals. Between, and overlapping with, the 'officially "valued"' and 'threat' orientations, the 'outcast surplus' orientation describes another perspective on farmed animals and endemic disease. Drawing on Marx's (1976) description of a 'stagnant' part of the (human) population, Collard and Dempsey (2017, p.91) identify persistently injured and elderly individuals as examples of animals which are 'superfluous' to capitalism and liable to be killed as a result. Here, and perhaps also in relation to other orientations (where the 'official' value of the animal is translated, on its death, from its generative potential as a living organism into a use value as food) the 'killability' (see Haraway, 2008; Giraud, 2019; Holloway et al., 2023b) of such animals is important in how they can be (dis)regarded, and discarded, implying that this can happen without the need for ethical reflection because of how they are categorised (e.g. as a food animal, or as a biosecurity threat). As a final point here, Collard and Dempsey (2017) highlight the importance of law as an 'orientation device', ordering and regulating economic conditions and the positions of lively commodities therein. Expanding on this, we can see a wider legal and governance framework constituting the field of animal agriculture and which is involved in regulating areas related to endemic conditions, such as farm animal welfare (e.g. Buller and Roe 2018) and endemic

Table 1
Farmer and Adviser interviewees (reproduced from Holloway et al., 2024).

Farmer (F) no.	Gender	Farm type, location and size	Adviser (A) no.	Gender	Adviser role
F1	female	L, sheep (BS300+)	A1	female	Pharmaceutical representative
F2	male	L, dairy (DC250-299)	A2	male	Cattle hoof trimmer
F3 and F4	female & male	U, beef (BC100–149), sheep (BS300+)	A3	male	Cattle hoof trimmer
F5	male	L, beef (BC50–99)	A4	female	Veterinary consultant
F6	female	U/L, beef (BC150–199), sheep (BS250-299)	A5	female	Levy board staff member
F7	male	U, beef (BC10–49), sheep (BS10-49), dairy (DC100-149)	A6	female	Livestock nutritionist
F8	male	U, beef (BC10–49), sheep (BS150-199)	A7	female	Vet
F9 and F10	female & male	L, beef (BC10–49), sheep (BS10-49)	A8	male	Vet
F11	female	U/L, beef (BC50–99), sheep (BS300+)	A9	male	Veterinary consultant
F12	male	U, beef (BC10–49), sheep (BS300+)	A10	male	Vet
F13	male	U/L, beef (BC50–99), sheep (100–149)(until recent retirement. Now has BC0–9)	A11	female	Vet
F14	male	U, sheep (BS300+)	A12	female	Vet
F15	male	U/L, dairy (DC300+)	A13	male	Farm consultant
F16	male	U, dairy sheep (BS10-49)	A14	male	Veterinary consultant
F17	male	U, dairy (DC100-149)	A15	male	Livestock auctioneer
F18	male	U, dairy (DC10-49), sheep (BS10-49)	A16	female	Vet
F19	male	U, dairy (DC100-149)	A17	female	Farm consultant
F20	male	U, beef (BC100–149), sheep (BS300+)	A18	female	Farm consultant
F21	male	L, beef (ND), sheep (BS300+)	A19	female	Assurance scheme assessor
F22	male	U, beef (BC10–49), sheep (BS100-149)	A20	male	Vet
F23	male	U, beef (BC10–49), sheep (BS300+)	Adviser Group	2 female & 1 male	Provide services for vets
F24	female	U, beef (BC10–49), sheep (BS200-249)			
F25	male	L, beef (BC250–299)			
F26	female	L, sheep (BS10-49)			
F27	male	U, beef (ND), sheep (ND)			
F28	male	U, sheep (BS300+)			
F29	male	U, beef (BC300+), sheep (BS300+)			

'Farm type and size' column includes an indication of location (U = upland; L = lowland), and of farm size using a categorisation of numbers of breeding cattle and sheep as indicated by farmers in a pre-interview questionnaire, although some farms had large numbers of non-breeding animals as well as other enterprises. BC = breeding beef cattle; DC = dairy cattle; BS = breeding sheep; ND = animals present but data not given.

disease eradication protocols (e.g. Best et al. 2020; Holloway et al. 2023a; Shortall and Calo 2021). Such frameworks can involve mandatory responses in some cases (for example, where a disease is notifiable), but can also involve the construction of advisory or guidance frameworks designed to influence, but not mandate, farmer behaviour (as is the case for lameness and BVD in England). They are key to understanding how in practice endemic diseases are addressed on farms, and to how the 'liveliness' of animals as commodities is framed, used, and sometimes feared, in agricultural situations.

We have discussed how some aspects of what makes farmed animals 'lively commodities' - their susceptibility to illness or injury - threatens or compromises the other aspects of their liveliness – their ability to reproduce, grow or be economically productive in other ways (e.g. in secreting milk) - which are exploited by people in farming them for food. Taking a different perspective on such economically threatening or compromised animals, we can at the same time understand them as situated within relationships of intersubjective care (Harbers 2010; Holloway et al. 2023b, 2024; Puig de la Bellacasa 2017). Gibbs (2021), for example, refers to the 'unsound [animal] bodies' which can become subject to human care, while Franklin and Schuurman (2019) discuss people's care for aging and ill animals. While this notion of care is not unproblematic – in farming it takes place in relationships that may also simultaneously be exploitative (e.g. Giraud 2019; Williams 2004) - these perspectives reposition animals away from being simply economic commodities, or even actors, to recognising them as subjects capable of experiences, including of suffering, and worthy of care and human 'response-ability' (Brown and Dilley 2012; Haraway 2008). Sunaura Taylor, in her book *Beasts of Burden* (2017), adds a further perspective through her consideration of the potential for discussing farmed animals as 'disabled', drawing parallels between the condition of many such animals (which she describes as 'animal crips') and thinking about disability in relation to people. As she writes, 'the disabled body is everywhere in animal industries' (p.xv), and that '[d]isabled and ill animals bring up historical associations of disability with the fear of contamination. The downed, sick - or even potentially sick – animal becomes the symbol of what is unhealthy, dirty and dangerous about industrialised animal farming' (p.37). Taylor contrasts social norms of able-bodiedness and fitness, which apply to nonhuman animals as much as to humans, with the evidence of frequently injured, disabled, and suffering bodies of farmed animals. In a similar way to that suggested above, Taylor argues that it is particular farming systems and practices, and their histories of human-nonhuman relations, which tend to lead to farmed animal disability, giving as one example lame cows in intensive dairy farming systems. Here, the threat posed to '"normal" and "healthy" cows' is problematised by the way that these cows are 'actually neither healthy nor normal thanks to the way the animals are bred and the unhealthy environment wrought by factory farms' (p.37). Taylor argues that prejudices against disabled bodies are associated with the culling policies which are deployed in response. Here, even while culling can be presented as compassionate and a product of a kind of care, there is clearly a link between a judgement about the subjective experience of disabled animals as suffering and having a low 'quality of life', and their status as (lively) commodities entangled in economic production; 'the advice is to "destroy" them before they contaminate your gene pool and damage your profits' (p.34).

Drawing these various literatures together, our discussion of how farmers and others address endemic disease in farmed cows and sheep in England thus examines intersections of the problematic 'liveliness' of, and the problematics of care for, lively commodities which can be (to draw on Taylor) 'disabled' in some part because of the farming practices and environments in which they are grown. After describing the context of the research by briefly outlining the exemplar diseases and describing

our empirical research, we thus explore the anticipatory process of breeding farmed animals, the commodity situations and moments in which animals become commodities, and how care takes shape around lively commodities.

3. Researching lameness and BVD

In this section we briefly describe the nature of lameness in cattle and sheep, and BVD in cattle, before outlining our research methods.

Lameness, defined as an abnormality in animals' mobility (Cutress 2020), is associated with multiple causes, both infectious (bacterial) and non-infectious, and is potentially very painful. As it limits mobility, lameness affects animals' ability to feed, and thus their economic productivity. Addressing lameness on farms can involve preventative methods such as foot bathing and hoof trimming, prophylactic or therapeutic medication, and decisions to cull lame animals. It can also involve changing aspects of management and the farm environment, for example by changing walking surfaces or the layout of buildings (see e.g. Lewis and Green 2020; Tunstall et al. 2019; Whay et al. 2012).

As an infectious disease with a single viral 'cause', BVD contrasts with lameness. As with lameness, however, there are important effects on animals' productivity, as BVD infection is likely to reduce growth rates, milk yields and fertility. Calves can become infected with BVD in utero if their mothers contract the disease at a certain point during pregnancy. Such calves are then 'persistently infected' (PI), incurable, and will be infectious to other cows throughout their lives. These other cows become 'transiently infected' (TI), may show the symptoms and reduced productivity associated with viral disease, and, if pregnant, may infect their unborn calves, but will themselves recover. BVD might not be noticed or suspected in PI calves, although they may show symptoms of viral disease including poor growth, respiratory problems and diarrhoea. BVD can be detected by testing, with the aim being to cull infected animals rapidly, and there are effective vaccines, although they have proven unable to eliminate BVD in our English case study (for detail see Brock 2003).

BVD and lameness are both the subject of reduction or eradication programmes which advise farmers on practices to adopt in addressing the conditions (see Holloway et al. 2023a; Shortall and Calo 2021). However, both conditions persist and are associated with significant economic costs to farming (Whatford et al. 2022). Whatford et al., for example, include lameness and BVD as amongst the most economically significant endemic conditions in UK agriculture, with costs from endemic disease estimated at between £77 and £548 per cow per year, and between £40 and £47 per ewe per year. The systemic causes of such conditions (that is, that they are a product of industrialised livestock farming) have, some argue, been neglected in addressing them (Bellet et al. 2021). Veterinary interventions, in this view, can be seen as supporting systemically problematic farming practices. For example they have been examined in relation to lameness and BVD (Shortall and Brown 2021; Shortall and Calo 2021; Wynands et al. 2021), as well as other endemic conditions (e.g. Enticott 2008; Enticott and Franklin 2009), wider aspects of farmed animal health and welfare (Enticott et al. 2011; Woods 2013) and biosecurity (Donaldson 2008; Hinchliffe et al. 2016; Shortall et al. 2016). However, in relation to the understanding of farmed animals as lively commodities subject to illness, injury or disability, and as potentially an economic 'threat', Cseke (2023) notes that the role of vets in the commodification of animals' lives is under investigated, emphasising how veterinary expertise underpins the economics of making farmed animals productive. He draws attention, for example, to advice on the maintenance of biosecurity as one veterinary contribution to farm productivity. Our research thus looks at farmers and advisers (including vets) together, as both are involved in addressing endemic diseases affecting farmed animals.

Our empirical research was with farmers who raised cattle (used to produce milk and/or beef) and/or sheep, and their advisers (including vets and other specialists), in the north of England (see Table 1). We included upland and lowland farms to try and capture some of the diversity of farming contexts in this region. The research was approved by the University of Hull Faculty of Science and Engineering Research Ethics Committee. Between September 2019 and March 2021, we conducted interviews with 29 farmers, selected to represent different farm size, types and upland/lowland environments. Interviews focused on the interviewee's role and biography, their farm environment, their breed choice and breeding strategies, and their knowledge-practices relating to lameness and BVD. Interviews with 21 advisers were conducted between March 2020 and March 2021, and focused on their roles and biographies, their relationships with farmers and animals and (again) their knowledge-practices relating to the two endemic conditions. Research was affected by Covid-19 restrictions meaning that most interviews were conducted by telephone or online. However 11 farmer interviews and two adviser interviews were carried out face-to-face. Recordings were transcribed and analysed using Nvivo software; the researchers developed a codebook specifically to analyse this dataset (DeCuir-Gunby et al. 2011). The codebook drew deductively on project research questions, supplemented by inductive codes created as analysis progressed. After creating the codebook each interview was independently coded by two of the authors. We draw on this analysis in the following empirical sections of the paper. We look first at breeding practices relating to lameness; second at commodity situations affected by lameness in cows and sheep, and third at the 'threat' to commodity situations posed by BVD-infected cows.

4. Breeding practices: anticipating lameness

Breeding farmed animals is an anticipatory practice which involves evaluating extant animal bodies, and making decisions about mating in accordance with objectives based on predictions, or expectations, of the characteristics of future generations. These characteristics include visual qualities (e.g. colour) as well as performance traits such as growth rate or milk yield. This sense of anticipating future animal characteristics, performed in relation to simultaneous anticipation of, for example, the future of the farm business or wider market conditions potentially in several years' time, is fundamentally related to the liveliness of animal commodities. It leads to their orientation as 'officially valued' (Collard and Dempsey, 2017). This is because of their capacity for reproduction through ongoing generations and their potential to become (in specific circumstances and biographical moments) exchangeable commodities. Traditionally, for cattle and sheep, such breeding decisions relied on an assessment of animals' phenotype (i.e. their appearance and embodied qualities), and (in the case especially of 'pedigree' breeding) their pedigree records, as indicators of what the characteristics of the offspring of particular combinations of male and female animals might be. These traditional processes have become supplemented by a set of 'genetic' techniques which claim to be able to predict the qualities of offspring with greater accuracy. These include statistical evaluations (known as linear assessments or Estimated Breeding Values (EBVs)) based on recorded quantitative characteristics of prospective parents and their relatives, and genetic markers, which are 'actual' genetic indicators associated with particular traits, taken from tissue samples (Holloway and Morris 2008; Morris and Holloway 2009). Breeders can thus prioritise qualities that they would like to see embodied in future generations of animals. As Holloway and Morris (2008) demonstrate, EBVs are contested (with breeders also emphasising other modes of evaluating their animals, e.g. based on visual appraisal and pedigree and health records), and involve making decisions about which particular EBVs to prioritise in any breeding decision. Simplifying greatly, they might, for example, emphasise 'production' traits (e.g. size, growth rate, milk yield), or traits related to health or temperament. In discussing breeding practices in our interviews with farmers, a wide range of priorities was expressed in relation to breeding cattle and sheep, including ease of calving/lambing, prolificacy, conformation (body size and shape), meat flavour, and behavioural characteristics like not being

'flighty' (F24). Selection practices related to lameness were discussed in detail by many farmers and advisers and we focus on this dimension of breeding a little further here as the ability to reproduce, and the passing on of hereditary components, is key to the 'lively' nature of farmed animals as commodities. It is important to situate this focus on breeding alongside the consideration of other factors that might exacerbate or mitigate against lameness (such as housing conditions, walking surfaces, and diet), and which farmers take into account in managing their farms and animals (see Holloway et al., 2023a, 2023b, 2024).

Selecting 'for' resistance, and 'against' susceptibility, to non-infectious lameness was a key practice. Although resisted by some farmers who retain some animals despite their susceptibility to lameness (see Holloway et al. 2023b), a key part of lameness-reduction strategies is that persistently lame animals are culled from herds/flocks, thus not contributing to the production of future generations. For example, one farmer said, 'if we had persistently overgrowing feet or anything like that, or a persistently lame cow, it would go' (F23), and another said that 'what we do know is that we can through genetic selection and prompt treatment we can … well eliminate is a strong word, but we can minimise the amount of lameness on a farm. So, a lot of it has to do with the willingness to do that [i.e. cull persistently lame sheep]' (A17). Others commented on how regularly-lame animals would be identified by marking either their bodies or their official documents (e.g. cattle 'passports'), so that they would not be bred from; for example 'with the cattle, we mark the cattle passport with red if something happens to a cow and we don't want to breed from it again just to make sure that we don't breed from it again' (F12). In other cases, interviewees talked about selecting particular breeds of cattle or sheep because of their reputations for resisting lameness. For example of the Lleyn sheep breed, one farmer said, 'It's got quite small, black, hard feet … they've got really good, solid feet on them' (F16); another farmer said, of Belted Galloway cattle, 'they look after themselves, they've got good feet … ' (F9) and a foot trimmer discussed cross-breeding to produce 'a bit of hybrid vigour in them … where they can withstand a bit of lameness' (A2). Similarly, interviewees discussed a general principle of aiming to create a particular kind of animal. The following comment was made in relation to a farmer's cattle and sheep,

> 'So we focus on creating a frame if you like … We look at something that's got good hooves, good conformation because if you haven't got good conformation, nothing will work. They'll be more prone to injury, they'll have bad feet' (F3).

The heritability of lameness was discussed by farmers and advisers in ways which emphasised the complexities of the relationship between lameness as a genetic trait and other on-farm circumstances which could affect its prevalence. The first comment below thus highlights the genetic and intergenerational component to the liveliness of these cattle, while the second and third emphasise the complexity and necessary compromises of making breeding decisions around lameness as an undesirable, genetically inflected, quality, when what it is possible to know about the resilience or susceptibility of animals is itself sometimes problematic, and when the available genetic techniques are unable to fully 'capture' what (in this case) a bull would genetically 'pass on' to his daughters when there are several competing, intersecting and interrelated qualities at stake.

> 'we need to be building some kind of resilience or resistance into our breeding stock … the genetic component to foot structure, I think, is colossal, that if we have a bull where by the time he's 5 or 6 years old, we find his feet starting to go wrong, his daughters will, a big, big percentage of those daughters will go wrong unfortunately … And likewise, tups [rams], I think there's a big genetic component to that foot structure which is why we're, I think, finding success from not retaining [lame] females or males … ' (F20).

> 'The challenge with EBV for lameness is because it's a health trait the actual inheritability of those as a genetic component is quite low. So, you will make sort of inroads into lameness by genetic selection alone. But it's a combination. You've got to keep resilient animals or keep selecting resilient animals and culling out the susceptible ones … [but at the same time] … you've really got to dampen down the disease. So that is removing and treating regularly lame animals. The reverse challenge to that is then that you can argue that the animals don't get a disease challenge. So, you can't find a resilient one because they don't get a challenge' (A17)

> 'it's very difficult to get a really, really good linear assessment on a bull, a bull who is positive for everything from calving ease, to foot health, to udder conformation, to production and you have to start being a little more selective and say, "well ok, well that bull isn't as great on his feet but he's got long teats" or something like that … [however, our breeding involves] choosing bulls that are known for good feet. All our breeding is for health traits. So it's strong bulls, strong feet, foot health' (F2).

Cattle and sheep which were prone to lameness could thus be seen, using the language of orientations (Collard and Dempsey 2017), as part of a killable 'outcast surplus', of persistently injured animals, as a 'threat' to future generations, and as 'disabled', in Taylor's (2017) terms, in ways which had negative implications for their individual welfare, for the welfare of future individuals and the collective future flock/herd, and for the management and economy of the farm. Conversely, selection 'for' resistance to lameness emphasises the potentially increased 'official value' of both the selected breeding animals and anticipated subsequent generations. Animals' biographies, in terms of their changing biographical status as potential contributors as 'breeding stock' to the production of future generations, were thus in part related to whether they were seen as disabled by lameness, and thus relationally orientated towards being either 'officially valued' or as part of an 'outcast surplus' and/or a 'threat' (both to future generations, and in terms of costs incurred for veterinary treatment and to farm productivity). This changing status is temporally specific and geographically situated, as for each animal, how they are 'oriented' as lively commodities varies over time (for example as they become lame) and space (e.g. propensity to lameness can vary with different farm conditions and management). As one adviser, a vet, commented,

> 'Farmers are always asking me, "genetically, can we breed our way out of this?". We can improve the animals' tolerance of their environment but you can't overcome it so you can't overcome management […] you can breed a cow that's less susceptible to going lame but then if you make her stand for up to 10 hours a day she's going to go lame' (A11).

This kind of comment re-emphasises the complexities of growing, or rearing, lively commodities which interact with their environments in ways which mean that a simplistic understanding of them as genetically determined is displaced when considering the biographies of their relationships with different parts of the farm environment and with farm management practices. We explore the biography of animals as becoming, in some circumstances, lively commodities, further in the next section, again focusing on lameness.

5. Lameness: disability, commodity moments and the 'threat' to value

Here, we look at the implications of lame animals being seen as injured or disabled, with effects on their becoming reared as lively commodities and the realisation of their exchange value during commodity moments.

First, lameness was regarded by many farmers and advisers as a production problem, a point made earlier in this paper. As one consultant (also a farmer) said about sheep, 'inherently lameness has its impacts on flock performance. Because of nutrition, that animal doesn't eat enough because it's not comfortable enough' (A17); a farmer described

lameness as having 'a huge impact on profitability as well because a sheep that's lame and in discomfort isn't producing as it should be' (F28), and another farmer discussed lameness as 'obviously pain in the foot leading to poor health, lack of productivity, reduced profit' (F23).

Second, at the same time, lameness is seen in terms which can be thought of as disabling animals, with many interviewees describing symptoms of lameness in ways which emphasise it as detracting from their expectations of 'normal' bovine or ovine functioning. Lameness is thus 'when an animal can't put its weight on all four feet' (F12), it is 'probably very poor mobility score, walking with an arched back, might not be weight-bearing on that foot, could be hobbling' (F2), and it is (once again) relational to the farm environment and to management practices;

> 'it can be an internal infection within the foot, or it can be an external wound, something actually injured the foot. It can even be a foot trimming that's been over harsh or that's gone wrong, it can be caused by cows being kept in the wrong environment, poor cow roadways and tracks' (F15)

For one adviser, lameness was viewed as being part of a complex of illness and age-related problems affecting certain animals in the herd;

> 'So in the context of a sheep flock, for me, it is those animals at the bottom end and it may well be that they're thin, that they're old, that their teeth aren't good enough, that they might have other untreated conditions … uncontrolled [intestinal] worms, all sorts of things. Lameness is just one of those things' (A18)

Such animals again can be seen in terms of the 'outcast surplus' orientation, regarded as such because of their biographical status as older animals, as disabled, and as a cost to the farm economy. 'Outcast surplus' status has further implications in terms of cost, legal obligation and killability, as the same interviewee notes;

> 'their welfare is compromised if you cannot do anything to alleviate their suffering, then the law says you should do something about it and the only thing you can do about it then is you've got to put them out of their suffering' (A18)

Such comments reflect the ambiguity of human-animal relations in farming, where 'care' is entangled with killing in circumstances where ethical and legal conceptions of good welfare obligate particular actions (Holloway et al. 2023b). In addition to this complex of animal age and injury, with legal and economic implications, lameness could also be seen as part of inter-species relationships in which human and nonhuman age and disabilities become entangled and produce each other through the hard, physical work that farming entails. As one adviser noted, 'the lameness thing might be that the farmer is 75 and he just can't physically cope any more so it's a physical limitation' (A18). In this comment, it is suggested that animal lameness can be an effect of increasingly limited human capacities related to the farmer's own biography of farming work, which draws attention to how animals' status and orientation as lively commodities is a relational effect of their positioning in specific human-nonhuman associations.

This sense in which people and animals together produce lameness can be taken further in considering lameness as a multi-species co-constitution. Most lameness in sheep, for example, is associated with the co-presence of microorganisms. One farmer said,

> 'I think it's the bacteria that lives in the soil and then when it's really wet and the condition of the grass and the feet and the mulching through these bacteria, I think it just catches into the foot' (F26)

Another referred to the risk that when treating cows for digital dermatitis, the 'bugs' (bacteria) causing that disease can be spread more widely around;

> 'If you've got a cow with digital dermatitis, you put it in the crush and clean it up, you've got that digital bug all around your crush. You're going to bring in healthy cows to routinely foot trim … but you've brought that cow into an environment that you know is loaded with digital bacteria' (F2).

Similarly, another referred to how feeding practices can help to spread lameness, saying that 'I think it's more to do with passing it on from sheep to sheep, so areas where they'll be holding together, around the hay rack' (F26). These examples where the 'liveliness' in evidence relates to infectious microorganic agents as well as to macroorganisms like cattle and sheep, leads to these animals being positioned in a 'threat' orientation to each other too, as animals infected with lameness-causing bacteria pose a risk to other animals, something also explored in relation to BVD in the next section.

Finally in this section, we consider how these issues relating to lameness lead to or affect the commodity situations and moments where cattle and sheep 'become' lively commodities. For one farmer, realising the exchange value of their animals is bound into a set of biosecurity practices concerned with reducing the risk of lameness. They discussed the trade-off between their preference for using an auction market to sell animals with the enhanced risk of infectious lameness through encountering other animals, contrasting this with the relatively safe (as far as infection is concerned) process of direct selling.

> 'You know you've had a fair price when you go to the auction and everybody's had a chance to bid on your livestock, if you know the value, we also do use the direct selling method through an agent where they go direct from our farm. I guess it's cutting out another transport and it's cutting out another source of infections like foot rot if they're not going through an auction where there's hundreds of lambs from tens of different farms … ' (F28).

The moments and ways in which animals become commodities vary and reflect different biographical events in the life of individual animals. For some, it is determined by a decision about whether the individual is suitable for selling as a breeding animal. In one example, the commodity moment comes when it is decided that a bull's feet are not good enough for him to be used as a breeding bull (because he would be likely to pass on susceptibility to lameness to future generations), and as such he will instead be sold for meat; 'if it's not right on its feet, we'll sell it at Selby [market]' (F5). In this case, the bull becomes one kind of lively commodity rather than another, with different kinds of value attached to him (bluntly, his value now resides in the conversion of his body into food for people, rather than in his capacity to produce future generations of cattle). In another example, a cow becomes a commodity at the moment she becomes lame, meaning that she will be sold for meat rather than continuing as a breeding cow. Here, the farmer describes the lack of lameness in the breed (Galloways) chosen for the farm, and discusses how this means that when there is a rare case of lameness requiring treatment, the affected animal is disposed of ('up the road') immediately because of the potential for lameness to recur: '[t]he foot formation of the Galloway is, they're very good, we don't get long toes, we don't need to trim the cows' feet … literally once in a blue moon do we have to trim a foot and off she goes up the road' (F6).

One particular site where the value of animals is realised is the auction market; lameness makes a difference again at the specific commodity moments where animals are sold. An auctioneer and livestock valuer told us that;

> 'a buyer isn't going to give the most amount of money for stock that is slightly lame … we sell everything through an [auction] ring so the buyer can see everything on their feet as well' (A15)

And that,

> 'All stock that has to come through the market has to be fit and healthy basically for sale. So the main thing we look for is everything walking correctly, there's no sign of severe lameness … Buyers don't want to be buying diseased animals or animals that are damaged,

especially if they're prime stock going to slaughter. They've got to be fit and healthy to be slaughtered' (A15)

Aside from the irony of animals needing to be fit and healthy to be slaughtered, the terms used in these comments ('stock', 'everything') are indicative of how the animals become commodities during the moments of the auction, regardless of any earlier identities they had, or relationships they were part of, while on farms – for example as herd conspecifics, or with people. The liveliness of these commodities is significant, here particularly because of the potential for lameness or other diseases to affect value, orientating them potentially as 'outcast surplus' (especially if their state means they cannot be sold for slaughter) or as a 'threat' inasmuch as lameness imposes a cost through reduced financial value.

In the final empirical section, we focus further on the ways in which diseased animals can be lively commodities which pose a 'threat' by looking at BVD in cattle.

6. BVD: infectiousness and threat

As with much lameness, BVD infection is a relationship between different lifeforms – in this case between cattle and viruses. The 'life itself' of calves infected in utero is changed by this, as their bodies and immune system are altered through infection. These inter-related livelinesses of cows and viruses affect the position of cows as lively commodities, and their orientations in relation to the production of economic value, in several ways. As two farmers explained it,

'BVD has impacts on all other aspects of farming and disease and impacts on immune response etc and fertility and sorts, if it is endemic within your herd. The disease itself, the danger is, if a cow is infected with the disease in the early stages of pregnancy, then the resulting calf, what they call a PI, persistently infected, and the virus somehow is able to utilise the cell replication mechanism within the host cells to produce more and more virus. So basically you end up with an animal that's genetically modified[1] to produce virus … it's excreting viral particles which can continue to infect other cows' (F18)

'BVD is a really horrible disease that actually attacks the immune system […] The really interesting thing is that you've got different aspects of the disease. So you can have a persistent infector. Now, a persistent infector is the real bad boy of the disease. A persistent infector is an animal that has been infected with the disease whilst in the womb. It's got this disease and its body has said "this is normal. This is fine. I don't need to get rid of this disease. I'll carry this disease for the rest of my life because this is part of my genetic make-up now". That calf will be born and no matter what you do to that calf, it will always carry the disease because he thinks it's normal' (F3).

Such calves are not only likely to be sickly themselves, but they present a persistent threat to other cows (as they are likely to infect them with the BVD virus, even if those cows are then only transiently infected). Like lameness, BVD is discussed as affecting PI and TI animals' productivity (through, for example, low growth rates and reduced milk yield), thus imposing a financial cost on farm businesses. A consultant said that BVD 'causes issues that mean they're more prone to other diseases coming in … having impact on their performance because it's knocking out their immunity and they're more prone to other diseases' (A17), while a farm animal health and welfare adviser said that 'I don't always want to come down to cost, but actually that can be quite a main driver for farmers … So I do tend to have a conversation with them about profit loss' (A5). Infected cows (whether PI or TI) are thus a 'threat' to the farm business, but in more complex ways BVD can also be seen as creating an 'outcast surplus' of infectious, infertile, damaged, disabled animals. As well as the reduced productivity and increased susceptibility to other infections associated with BVD, '[w]hat you would tend to see, again, in those [herds] would perhaps be abortions, still births, weak born calves, early embryonic deaths' (A4), or 'if a pregnant cow comes across BVD later in pregnancy then it may abort or it may have deformed calves' (A7). PI animals, in particular, are an ongoing threat because of their persistent capacity to infect other cattle.

Given that threat, biosecurity measures around BVD focus on preventing contact between infected and uninfected animals, in ways which affect the commodity situations in which cows are able to become commodified in particular moments and in particular places. Trade-related movement of animals (which tends to mean new contacts between animals) is thus regarded as risky, and the orientation of infected animals as a 'threat' to the economic value of 'officially valued' (uninfected, productive) cattle influences the mobility and circulation of bovine bodies as well as other practices such as vaccination and isolating bought-in cattle. As a farmer said, 'It's an aerosol droplet, isn't it, from memory? So there's a risk that if you take an animal to market and bring it home again then you might actually import the problem because of [BVD's] transfer mechanism' (F8). Similarly, a vet said,

' … buying in cattle or [contact with] neighbouring cattle are the biggest risks of BVD coming onto farms. But we also have lots of stories about other ways that BVD comes onto farms – you know, through auctions, sales and shows, and this sort of thing, and lots of other ways. So yeah that's the sort of thing I talk with farmers about quite a lot – the relative risks of different ways of bringing BVD onto your farm … You've just got to make sure that you've got systems in place to manage those risks. So those would be testing and isolating cattle when they come in, and vaccinating' (A1)

Commodity moments, i.e., exchanges of cattle through trade alongside other movements, involving potentially infected bovine bodies, are therefore risky. A farmer thus recounted how BVD had arrived on their farm in bought-in cattle. Some of the cattle proved to be 'empty' (not in calf, potentially through BVD-related infertility), while,

'One of the cows with calves at foot, the calf was not as big a calf as I expected and I thought maybe that was just a lack of milk or whatever. Later, that calf thrived less and less and I lost it [it died] but I didn't get it tested … I now think back and I think almost certainly that was a PI. From that, I bought the disease into the herd' (F13).

As this account suggests, the propensity of lively commodities like cattle to be infected with viruses, and to thus facilitate the problematic circulation of other lifeforms which may infect other cattle and reduce the productivity of cattle and farms, is key to understanding such animals as potential threats to 'officially valued' productive farmed animals and to the establishment of value in farming. The sense that, from the farmers' perspective, it is the commodity moments associated with trade and exchange of animals that are important was emphasised by a vet who contrasted the different realities of BVD for vets and farmers. For vets, BVD was known as set of 'clinical presentations', but for farmers, BVD is problematised as a factor to be considered during trade, so they will ask 'we're out to buy a new bull or we're out to buy a group of replacement animals, what do we need to do to protect ourselves against BVD? Do we need to test them? Do we need to vaccinate? So, farmers will ask questions from a purchase stock point of view' (A8). From these different perspectives it is different aspects of the liveliness of animals that matters in establishing, and perhaps changing, their orientations between 'officially valued' and 'threat' in relation to productive farming.

[1] Technically, BVD infection does not genetically modify the calf, but because the early stage embryonic calf's immune system is not developed, the presence of BVD virus becomes normalised for that calf, so that when the immune system is developed, BVD virus is not recognised as needing an immune response. We read 'genetic modification' here as a metaphorical reference to this in utero process.

7. Conclusions

This paper has focused on the commodity situations, i.e. the social relationships which constitute things as commodities, associated with potentially and actually diseased farmed animals as 'lively commodities'. It has discussed their different orientations (as officially valued, outcast surplus and threat) in relation to farming as a mode of capitalist production (Collard and Dempsey 2017), and also considered such animals as 'disabled' nonhumans (Taylor, 2017) and as subjects of a problematic care which is entangled with exploitation (Giraud, 2019; Holloway et al., 2023b). In doing this, we have used the term commodity moment to describe those particular moments of exchange, when animals' value as commodities is realised in ways which relate to an animal's biographical status in particular places at particular times. This emphasises how farmed animals can be seen as 'part-commodities', because in their inter- and intra-species relationships, and through their own subjective experiences and capacities, they are simultaneously other things too. Prior, during, and subsequent to those moments, animals have the potential to be valued in multiple ways. These include encounter values (such as the inter-species, inter-subjective relationships, and relations of care, they may have with people), their value as conspecifics in herd/flock environments, and the genetic, and even aesthetic, value they may have as potential contributors to future generations of animals (Holloway 2005). Commodity moments reduce this multiplicity to a financial value, even if that is associated with a range of other values (e.g. their value as food for people). Adding conceptualisations of nonhuman disability to existing work on lively commodities has provided a new way of thinking about how some animals can become oriented towards agricultural capitalist production as outcast surplus and/or threat.

Commodity moments are realised in different ways for animals existing in different orientations. Healthy animals, for example, can be sold because they are 'officially valued' as contributing to 'improving' herd or flock populations, because they can contribute 'work' through milk production (Stuart et al., 2013), or because they can continue to be grown for human consumption until they (once again) reach a new commodity moment when they are considered suitable for slaughter. As Kopytoff (1986) noted, it is important to consider the biographical journey of a commodity, including the question about what happens when the commodity reaches the end of its 'useful' life. This seems particularly pertinent in relation to lively commodities such as diseased, injured or 'disabled' animals where their status as outcast surplus and/or threat marks a particular biographical moment (e.g. a calf identified as PI, a sheep or cow diagnosed as persistently lame), with particular consequences for the animal. A focus on biography emphasises the importance of temporality in analysis of how animals become lively commodities at particular moments associated with their changing status (e.g. as 'youngstock', breeding animals or 'finished' animals for slaughter), with their ongoing productivity (e.g. their bodily growth, their rearing of their own young, or their milk yields) and with their positioning in inter-generational relationships of breeding. The temporalities and spatialities of farmed animals as lively commodities are complex. Their commodity situations (Appadurai, 1986) are a process, and are punctuated by commodity moments. Individual animals have an immediate exchange value, ongoing production and transgenerational values (e.g. milk, fertility and future young) and biographies which terminate at fixed points in the future (e.g. on sale dates or slaughter dates). At the same time, their orientations as lively commodities are related to the spaces they inhabit and how those spaces, and the animals, vary and are caught up in farm management practices. They are also related to particular sites, including those on-farm (such as sites of inspection, diagnosis and treatment) and off-farm (such as auction markets) where decisions are made and valuations achieved.

Collard and Dempsey (2013) discuss how lively commodities can be individual animals or (for example) ecological collectivities; in the case of farmed animals, individuals have value and herd/flock populations have collective value. These positions and values are also evident in thinking about disease and disability. For example, a lame sheep is encountered as in pain, as experiencing poor welfare, but also as potentially a threat to future generations because of a genetic predisposition to the condition. Similarly, a suspected or proven PI calf might suffer symptoms itself, but is also a threat to its herd, because of its ability to spread the virus widely. Taking Collard and Dempsey's point about collective lively commodities a little further, such collectivities cannot thus always be considered as always beneficent. In a way similar to how Giraud (2019) suggests that an acknowledgement of the entanglements of humans and nonhumans risks being regarded as sufficient, without asking the question of what problematically happens both to produce, and as a result of, an entanglement, we need to ask what are the implications of the collectivities we have explored here. Further, our examples of lameness and BVD involve interspecies collectivities (of cattle/sheep and bacteria or viruses (see Mahon et al., 2024; Lorimer, 2017, for a wider perspective) which, as assemblages constituting lively commodities, produce diseased and disabled individuals and biosecurity threats to wider populations. This is associated with the governance of agricultural biosecurity and animal welfare, through (for example) health planning, welfare certification and disease eradication schemes for both BVD and lameness (e.g. Holloway et al., 2023a; Shortall and Calo, 2021). The existence of this governance reflects Collard and Dempsey's (2017) emphasis on the importance of legal and regulatory frameworks surrounding lively commodities in their different orientations – in these cases to determine what happens to animals regarded as outcast surplus or deemed to be a threat.

A focus in this paper on nonhuman disability has added to existing work on lively commodities and care in situations involving farmed nonhuman animals. Doing so contributes a different perspective on the orientations of lively commodities in relation to capitalist agriculture, offering a way to explore intersections between the growing of animals as (lively) commodities, understandings of disease, injury and disability, and the multi-species co-constitution of commodity and disease situations.

CRediT authorship contribution statement

Lewis Holloway: Writing – original draft, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Niamh Mahon:** Writing – review & editing, Methodology. **Beth Clark:** Writing – review & editing, Methodology. **Amy Proctor:** Writing – review & editing, Methodology, Funding acquisition.

Declaration of competing interest

None.

Data availability

Data is currently being prepared for the UK Data Service and will be available to other researchers once deposited

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