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(Dis)Entangling Livestock Marketplaces: Cattle Purchasing, Fluid Engineering and Market Displays

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Highlights

- Regulating cattle purchasing at livestock markets is a key strategy in reducing animal disease transmission.
- Farmers' cattle purchasing practices reflect a form of fluid engineering to maintain farmyard cultures.
- Farmers use a range of strategies when purchasing cattle.
- Cattle purchasing is facilitated by front and back-stage market devices
- Symbolic signs of genuine cattle and good farming influence purchasing more than objectified risk metrics.

Keywords

Markets; market devices; farming; farmer behaviour; science and technology studies; biosecurity; good farming

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Ethics Statement

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to and the appropriate ethical review committee approval has been received from the School of Geography and Planning's research ethics committee at Cardiff University.

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Abstract

Livestock markets are pathological sites in which contrasting biopolitical regimes compete to reconfigure agricultural practices and identities. Whilst the circulation of cattle is central to agricultural geographies, little is known about the practices of cattle trading or the role of livestock markets in cattle purchasing. Drawing on recent attempts to conceptualise the process of marketisation, this paper seeks to invigorate research into livestock markets. Specifically, the paper conceptualises cattle purchasing as a market encounter in which socio-technical arrangements, devices, and bodily performances entangle cattle and farmers, enabling markets to work. Using data collected from interviews, focus groups and participant observation at livestock markets in England, the paper makes two contributions. Firstly, the paper shows how farmers' cattle purchasing practices are organised by practices of 'fluid engineering' that seek to maintain the 'farm system'. Secondly, the paper shows how at livestock markets, these strategies are mediated by front and backstage 'market displays' by farmers and auctioneers which produce market price through a series of performances that are carefully spatially and temporally ordered. Specifically, these displays perform specific rural and agricultural identities, such as the 'genuine' or 'good' farmer. In creating these spatial frames, frontstage displays diminish the relevance of backstage displays that rely on abstract calculations by distant others. The paper therefore reveals the intense entanglements and socio-technical work that is required to make cattle markets function and their wider relevance for the management of livestock diseases.

1. Encountering Livestock Markets

In the north of England, a livestock auction is ready to begin. In ones and twos, sometimes more, cattle enter the ring, some slowly, others eager to meet potential new owners. At the front stand a huddle of men, leaning on the protective barriers, thumbing through the day's sales list. Behind them, a theatre: on tiered seating the audience looks down on the animals, as if waiting for a show to begin. At the centre stands the auctioneer, gavel in hand, surveying the crowd, looking for his regulars who are likely to be interested in the animals – or beasts as he calls them. Above the auctioneer's box, a screen flickers, displaying some information about the sale: age, location and health status. Is the audience looking at it? It's hard to tell. Maybe instead, they have one eye on the cow and another on the auctioneer's box in which a farmer – the owner of the animals for sale – is now standing, holding a £10 note in the air.

Scenes like these are common to livestock farming. Yet curiously, in the global north¹, livestock markets appear to have escaped empirical or conceptual attention within contemporary social studies of agriculture. Whilst studies exist of the history (Specht, 2019; Rowling, 2015) closure (Wright et al., 2002) and survival of livestock markets (Nye et al., 2021), analysis of the processes and practices within them appear more elusive (exceptions include Pilgeram (2007) and Kuiper and Haggo (1984)). This absence is surprising for two reasons. Firstly, livestock markets continue to represent an 'obligatory passage point' (Callon, 1986) in the trade of agricultural animals. In the UK, 12 million sheep and 1.6 million cattle pass through a livestock market per annum, whilst 93% of farmers claim to regularly attend one (Livestock Auctioneers Association, 2017; Rickard, 2019). Livestock markets play a central role in the distribution of livestock but also enact a particular mode of agriculture that is reliant on the circulation of animals (Law, 2006). At the same time, these mobilities are associated with the circulation of animal disease (Robinson and Christley, 2007), leading to the recasting of livestock markets as a pathological space in which new biopolitical regimes seek to reconfigure agricultural practices and identities. Indeed, in this pandemic era, livestock markets have become the site of moral panic, requiring their closure to prevent the further creation and circulation of unknown diseases (Keck and Fearnley, 2020).

Secondly, perspectives from anthropology (Carrier, 1997; Carrier and Miller, 1998) and science and technology studies (Callon, 1998b; 2021) have reinvigorated interest in markets, and marketplaces as part of efforts to examine and conceptualise the processes of marketisation (Çalışkan and Callon, 2010). These perspectives have provided the focus for new studies of the social-technical arrangements, referred to as 'market agencements' (Callon, 2021), that organise the conception, production and circulation of goods; and encompass the tools, devices and skills that seek to articulate and make sense of the qualities of goods. These practices and devices of valuing and qualification (Callon et al., 2002) are central to what Callon (2021) refers to as 'qualculative agencies' that frame and organise the entanglement and attachment of commodities and consumers thanks to a range of 'market devices' or 'mediating activities' (Çalışkan and Callon, 2010). In these studies, the marketplace is not a pure or neutral economic space but entangled with social and technical relations that produce the market and economic identities. Studies have therefore focused on the ways in which the marketplace is organised and performed (Leyshon et al., 2005; Knorr-Cetina, 2003; Mackenzie et al., 2008) through different strategies and devices that makes the marketplace familiar and navigable. In agricultural studies, these perspectives have directed attention to the role of market devices, modes of calculation and standardisation (Lockie and Higgins, 2007) in relation to commodities such as red meat (Henry, 2017) as well as cattle trading (Enticott, 2016; 2021; Phoenix, 2021). Whilst these studies reveal much about agricultural markets, they say little about the *place* of the market and the encounters therein: their design, practices, spatialities and identities. Yet, as others have shown, the spatial design of market*places* is vital to understanding how the identities of buyers and sellers are created and conferred (Geertz, 1978; Garcia-Parpet, 2008; Callon, 1998a), and how market prices are produced through a series of performances that are carefully spatially and temporally ordered (Çalışkan, 2007; 2010).

Drawing on these perspectives, the aim of this paper is to invigorate the study of livestock markets as sites of special social scientific interest. As a starting point, this paper explores the socio-technical organisation of cattle purchasing, and the technical and embodied skills of valuing that are brought to bear during market encounters to create attachments between farmers and cattle. In doing so, the paper makes three contributions. Firstly, the paper describes the practices and devices used by farmers to value cattle and navigate market

encounters. Drawing on hydraulic metaphor (Law, 2006), the paper reveals how cattle purchasing is enacted through practices of 'fluid engineering' (Higgins et al., 2018) which maintain and repair the heterogeneous relations that together create the farm system (cf. Burton et al., 2012). Here, the paper describes how farmers' purchasing practices seeks to (re-)engineer farm systems through a strategy of 'fitting the system'. The imperfections of the marketplace mean this strategy is less tightly configured and more an adaptable strategy to navigate market encounters through the accommodation of uncertainty. In doing so, the marketplace reflects a borderland (Hinchliffe et al., 2013), in which disparate farming systems are entangled and reconstituted through imperfect connections.

Secondly, the paper identifies how cattle purchasing is organised by specific practices of connection – what Caliskan and Callon (2010) refer to as mediating activities or market devices – which are performed within livestock markets themselves by farmers and auctioneers. Importantly, these performances invoke distinct categories of spatial and agricultural identity as a means of entangling cattle and farmers. Drawing on Goffman (1959), the paper distinguishes between front and backstage practices of connection, referred to as 'market displays'. The paper shows that frontstage in-person displays by auctioneers and farmers during auctions perform specific rural and agricultural identities, such as the 'good farmer' (Burton et al., 2021). In creating these spatial frames, frontstage displays diminish the relevance of backstage displays that rely on abstract calculations by distant others, allowing otherwise highly entangled markets to function. Relatedly, the final contribution is to demonstrate the wider relevance of these understandings of cattle purchasing for the control of animal disease. Here, the paper raises questions about the effectiveness and limitations of quantified disease risk data to guide purchasing decisions.

The paper begins by explaining the methodology, before conceptualising cattle purchasing through the lens of fluid engineering. In explaining farmers' cattle purchasing practices, the paper then turns to the role different market displays play in organising livestock markets, and the various entanglements that order the circulation of cattle. In conclusion, the paper reflects on the implications for the governance and regulation of livestock movements.

2. Methodology

In England, livestock markets are regular events held at purpose built 'marts' across the country, accounting for 55% of all cattle sales (Little et al., 2017). Livestock markets are usually part of the business portfolio of land and property agents, selling livestock, agricultural machinery, property, antiques and business advice. Declining market sales have led to the closure of livestock markets and concentration within fewer large purpose built facilities with good transport links (Nye et al., 2021). Each market has a programme of events, setting out on which days which animals are sold: some market days may involve the sale of all types of livestock, other days may be restricted to certain kinds (e.g. sheep or cattle). Whatever livestock are sold, the routine is similar: animals arrive at sales yards in the morning and are available for inspection until the auction begins. Market reports documenting average and highest prices are published after the sale has concluded. Smaller animals (e.g. sheep) may be sold from the pens in which they are kept. Larger animals (e.g. cattle) will be taken by a drover to an auction ring where the auction takes place. Auctions may take one of three forms: a regular market in which the animal is sold to the highest bidder; a dispersal sale in which a herd is sold off due to the closure of a farm (dispersal sales may occur on regular market days or as standalone events); or a show and sale at which the prize winners may be sold through auction subject to reserve prices being achieved. In each type of auction, animals may be sold individually or in groups. Information on each lot will be provided in the sale programme and also the market's website prior to the sale. This may refer to basic information such as owner, breed and age, through to production characteristics, health status, and other metrics of animal bodies (Holloway, 2005). Generally, auctions take place in person, but were moved online during the Covid-19 pandemic.

Data referred to in this paper were collected as part of a project investigating farmers' cattle purchasing behaviour in order to assess how different market devices (such as providing information, ratings and scores) could influence purchasing choices and reduce the spread of endemic cattle disease, specifically bovine tuberculosis. A number of methods were used to collect data. Firstly, interviews using the Biographic Narrative Interpretive Method (BNIM) (Wengraf, 2004) were conducted with 31 farmers in England. This interview technique was chosen because it allows interviewees to reflectively think through their farming practices

and decisions to reveal their contextual nature. Secondly, seven farmer focus groups were held involving 56 farmers. Five focus groups were held at livestock markets allowing the researchers to conduct participant observation at the markets and involve veterinarians and auctioneers in focus groups (see supplementary information for further details). Participants were selected because they had received advice on cattle purchasing during a biosecurity advice visit conducted by veterinarians. Participants were drawn from two areas of England with different levels of endemic disease: a high-risk area and a medium risk area known as the Edge³.

All interviews were recorded, fully transcribed and thematically analysed within Nvivo. Analysis focused on identifying cattle purchase factors, triggers leading to changes to cattle practices, and the role of different forms of information in cattle purchasing decisions. Fieldnotes from participant observation taken after watching livestock auctions were included in the analysis. With the permission of auctioneers, sales of cattle were filmed to triangulate with fieldnotes and interviews.

3. Cattle Purchasing as System Engineering

The work of cattle purchasing begins on the farm. It is here that farmers' cattle purchasing decisions begin to be arranged, inscribed in what farmers refer to as their 'system'. The system is dynamic, constantly evolving thanks to its heterogeneous composition of relations between humans, animals, natures and materials. In this sense the system is similar to what Burton et al. (2012) refer to as 'cowshed culture'. These relational assemblages both structure and are structured by decisions made by farmers, defining each farm's own distinct pathway or 'trajectory'. Importantly, these relationships are not confined to individual farms, but stretch across local, regional and national scales. For example, diseases may spread between farms, as do cultural expectations of what counts as appropriate farming conduct, or 'good farming' (Burton, 2004).

The system, however, is not permanent but constantly in the making by those that constitute them. As such, farming involves constant work to maintain and repair these relations as best as possible to ensure the smooth flow of agricultural production. Priorities may vary between

farmers affecting how they interpret the signals transmitted by these relations, but the broad thrust of their work is aimed at preserving the continuity through stability of the farm system. The spread of relationships within the system could entail simple connections, but overtime may evolve into a complex arrangement as represented in figure 1. Disruptions to the constitutive elements of the system – new presences or absences – affect the way these relationships can be held together and can have significant consequences to the work required to maintain them. Disruptions can be sudden changes or build up over time. The introduction of a disease to a farm can be seen as a fairly obvious disruption, but there will exist a wide range of other ways a farm system can be disrupted.

Viewing the farm as complex ecology of relations is similar to the way other socio-technical systems are maintained and repaired (Henke and Sims, 2020). In these studies, the concept of ‘overflow’ is deployed to describe how systems breakdown and fail, or conversely can be seen as a normal part of any system (Law, 2006). In biosecurity studies, overflows are leakages from a system that cannot be contained: a failure of barriers that usually ensure that relationships are held together. In complex systems, these leakages and overflows are inevitable: where systems are tightly coupled, they require constant monitoring, but the degree to which this work can always be completed means that it may not be possible to prevent leakages (Perrow, 1999). The complexity of the relationships that form the farm system also make failures inevitable: they are ‘normal’ parts of the system (Perrow, 1999). The result may be a series of cascading overflows that make systems unworkable.

System overflows should encourage debates and generate new practices and technologies to resolve them. Law (2006) refers to this as ‘fluid engineering’: the task of trying to ensure that relational ecologies function by permitting the effective flow of goods, materials and people within these ecologies without leakage. On the farm, Higgins et al. (2018) suggest that farmers themselves engage in engineering as a means of managing overflows and secure farms from disruptions. Cattle purchasing is one way in which this ‘fluid engineering’ takes place, reflecting an attempt to maintain existing farm systems and keep them flowing. Indeed, given the extent to which it is implicated within social, economic and biological relationships, cattle purchasing represents an important practice in the maintenance of farm systems. The purchasing of cattle can be a response to and way of managing overflows and preventing

further disruptions to each farm's system. In this sense, the system configures how farmers purchase cattle by inscribing which cattle correspond to the farm system.

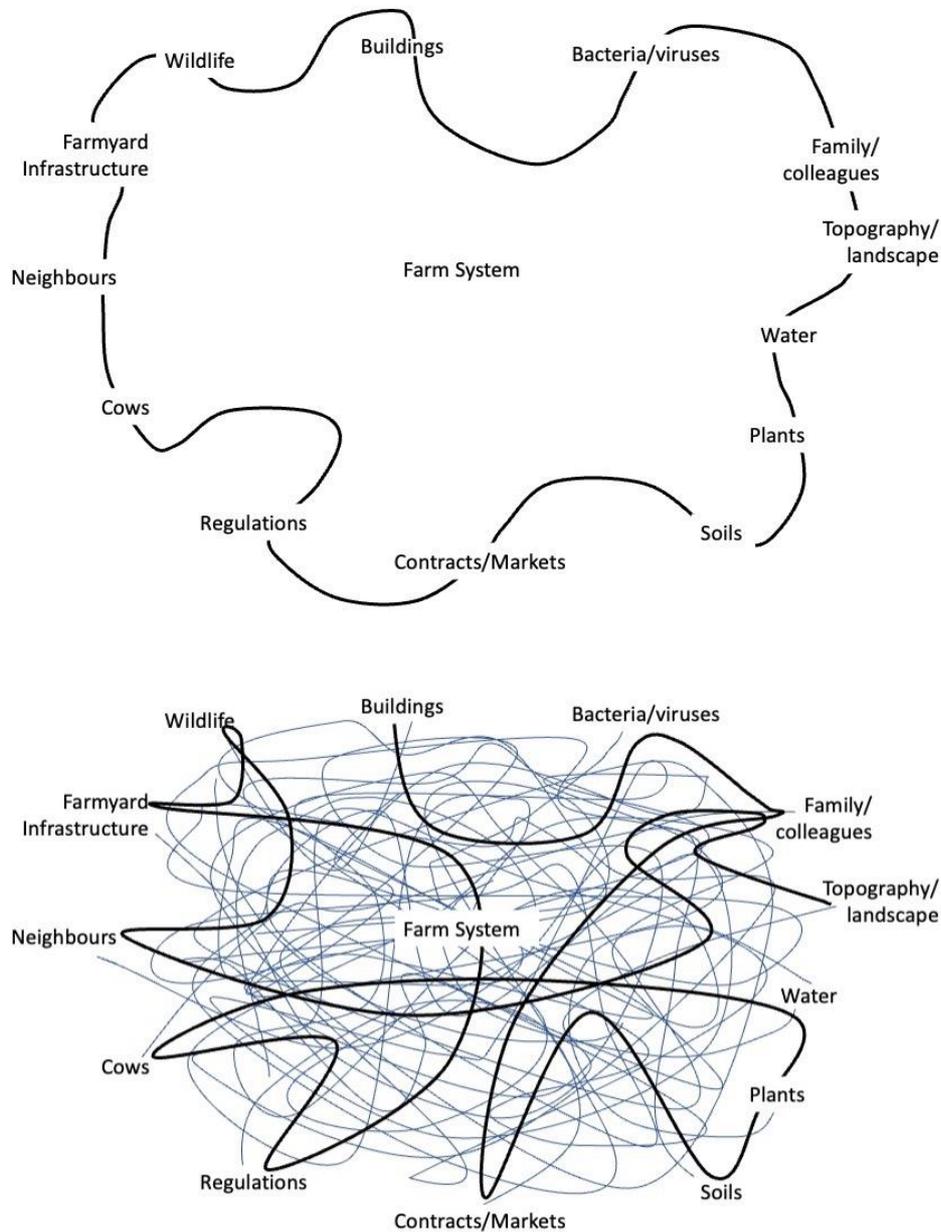


Figure 1: Farmyard cultures as a relational ecology. The first diagram represents an idealised smooth relational assemblage, represented by the simple connecting black line that holds the farmyard culture together. The second diagram represents the reality: a complex relational topography that emerges from the legacy of previous relations, depicted by the thinner lines in the background.

4. Fitting the System

The way farming systems inscribe cattle purchasing choices is reflected in a purchasing strategy farmers refer to as 'fitting the system'. This strategy represents attempts to find and insert cattle into the system to avoid disturbing it and thereby ensuring its continuity and avoidance of new overflows. At its most basic level, the strategy of 'fitting the system' involves matching replacement cattle to the kinds of herd management practices that determine all subsequent activities on the farm: what cows are fed, when they are calved and what labour is required to manage them. Cattle purchasing decisions therefore seek to match new cows with herd management practices, such as synchronising purchased cattle to a seasonal calving pattern:

'When you're trying to have, you know, an extensive grass-based system, and, you know, you're not going to go out and buy a load of Holstein cattle. You're going to go out and you're going to buy a load of New Zealand Friesians' (FG07)

Four dimensions appear to be particularly important to fitting the system. Firstly, biologies and natures. As the quote above suggests, different breeds of cows have different characteristics, some more productive than others, some hardier than others and some with different temperaments. The interactions between cattle, soils, and topography of the farm produces a kind of animal that fits the system:

'I don't like the Holstein type because I like the Friesian type on my system, a bit more sturdy... well, not sturdy. I turn out on fields a lot, them, Holstein boys, they tend to leave them inside a lot and feed them heavy and but mine are just general... not a high yielding herd, I'm medium, so I don't have to push them as hard, and they have to walk three quarters of a mile across there to the other field so you want something what wears well. They sell well at the end of their working life as well. No, the other... the back of that house, my land starts going a bit, it's sort of steep hills. You need sound cows with good feet, mobility, locomotion, how they walk nice and keep going, yeah'. (Edge 06)

Secondly, the materialities of the farming system configure which cattle best fit within the system. For example, some dimensions of farm systems are more immutable than others, such as old milking parlours or sheds. These sheds often have poor ventilation which creates health problems but would require significant – often excessive – financial investment to resolve. Soil types and topography are also not easily changed. Height could preclude some

animals from fitting a farm system, requiring alterations to farming infrastructure that would prove too costly. As a result, fitting the system requires the careful selection of cattle that can accommodate the affordances of the system. For example:

'My buildings are like a lot of buildings put up in the 80's/90's, they're not as big as... you know, they're not as spacious as modern ones are, so everything is a little bit more restricted. And when I put it up, cows were like 600 kilos, and now you're talking about 700 kilos, you know, and the cows are too big for the buildings really. And I felt that was pressurising them, so that's why I went cross-breeding, to try and breed a smaller cow, looking for a more multipurpose cow. A gritty cow, should I say, one that's tough, like if it falls over, it gets up again' (HRA04)

Thirdly, farmers themselves also require matching to fit the system. Specifically, sales and sellers needed to be judged to be 'genuine' in order for a sale to proceed:

'you'd go to the same market for years and years, you know who are the genuine people and who are maybe not quite so genuine, and this, that and the other. You haven't got to bid for everything, you've got personal preference, haven't you?' (HRA05)

In referring to 'genuine sellers', farmers referenced the kinds of symbolic capital that usually distinguishes who is a 'good farmer'. Reputations were forged through the symbols of the 'good farmer', creating cultural capital and trust. Here farmers were seeking assurance that the farmer possessed the qualities of a good farmer: a 'fair-dealer', honest, and trustworthy (cf. Hidano et al., 2019). Qualities such as professionalism, hard work and being successful were equated with good farming, which could be assessed by visiting a farm to view stock prior to purchase to check that farmyards were clean and tidy, free of 'junk' and waste plastic littering the farm (cf. Burton, 2004). Knowing who you were buying from allowed greater control over the quality of the animal farmers were buying. These forms of trust and moral codes create inertia in farmers' own farming systems. Once a reliable source of cattle had been found that matched their own system, farmers would continue to use that source for as long as possible. 'Loyalty' therefore became a significant characteristic of good farming: loyalty was vital to negotiating mutually beneficial cattle sales to deal with market volatility. Conversely, where long-term relationships broke down due to commercial pressures (such as selling to a new buyer at a one-off higher price), lack of 'loyalty' was blamed:

'I had a good relationship with someone and then last year... I work on a lot of loyalty, he... somebody else offered him more money. I wasn't prepared to get anywhere close to it and he went with him. I said, well, I won't be back next year and I've been here for the last four years and he won't be here. Which is a shame.' (HRA03)

Finally, affective aesthetics influence attempts to fit the system. Assessing the value of cattle is closely connected to farmers' subjectivities: fitting the system involves being able to assess 'the look' of cattle, gauged through the practical skills of the stockman. These skills reflect the cultural capital of a 'good farmer' – possessing the 'stockman's eye', a form of intuitive expertise to identify animals that would fit a system and maximise the economic return for the farmer. Farmers described different animal shapes and characteristics (such as square and robust) as being important to them and their system. Parts of the body were also important – the 'back end', as well as feet and udders for dairy cows. These needed to look 'right' and be balanced: cattle that were too extreme one way or the other tended not to be seen as good options. Animals that were 'wild' or had poor temperament regarded as too much of a risk by many, but could fit some systems:

'the young beast runs into the ring, hits the other side and the auctioneer guy goes from asking 600 quid to 400 quid and then there's my mate, he perks up and steps forward then and he comes back with some right rare things sometimes, claggy tails and little bull things. He loves little bulls and things he picks up cheap and takes, dead weight, doesn't matter to him' (Edge 05)

Other modes of valuation that seek to standardise the market provided another way of objectively determining value (Holloway, 2005). Statistical measures such as estimated breeding values (EBVs), and ways of quantifying health status were important to those farmers to whom 'it doesn't really matter what they look like, I'm a numbers person' (Edge 02). Whilst these forms of valuing created desires for certain animals, for others fitting the system was less about aesthetics, and more about calculating economic value:

'some cattle do better than others, you know, and you're... but at the end of the day it comes down to price, it's got to be price, that's... you know, if you see that animal there and it's... and it looks right and it's the right money then you buy it' (FG09)

5. Stretching the System

Fitting the system would be an easy task if systems were predictable and the marketplace perfect. Instead, the opposite is true: as Specht (2019: 165) suggests, cattle trading is a 'messy and unpleasant process'. Cattle are not available when needed, or available when they are not required. System overflows, such as disease outbreaks, regulatory changes, family circumstances or economic conditions may also influence the ability to fit the system. For

example, farmers may face cash shortages or cashflow problems that mean only certain kinds of cattle can be fitted to the system. Competition from other farmers may also affect how systems are maintained. For example:

'You know, it's all about the money and it's all about the cash and my system. There's a lad that goes to market and if he's there I know I'm in trouble, I won't be able to buy anything because he's got a slightly better system than me' (Edge 03)

This makes finding a 'perfect match' a rare prospect. Were farming systems to be tightly coupled, this would be a problem leading to inevitable system failure (Perrow, 1999). In practice, however, the farm system acts as an adaptable device that guides cattle purchasing decisions rather than tightly configuring them. Rather than fitting the system, other strategies emerge such that fitting the system is more akin to a form of agricultural 'tinkering', the 'skilled craftwork [that] lies at the heart of the repetitions of farming, but those craftwork practices also pick up, pattern, and are patterned by other parts of the farming environment' (Singleton and Law, 2013: 264). This making-do through practical adaption to an imperfect environment was summarised by one farmer as, 'you've got to work with what you've got...its all a mish-mash and higgeldy-piggledy...Nothing ever works out well' (Edge 09)

If the system cannot tightly configure cattle purchasing decisions, what emerges instead is a strategy best described as 'stretching the system'. In this sense, purchasing is not random, but an attempt to balance different parts of the system reflecting that it may not be tightly coupled, but composed of fragile relationships. The system therefore works because of its imperfections. Thus, purchasing cattle comes to represent what Miller (2002) describes as 'aesthetic totalisation' in which a wide range of values are brought into some-sort of alignment whilst recognising the complex and heterogeneous entanglements implicated in purchasing. Stretching the system therefore means that farmers may have to 'bite the bullet' (FG 09) by sacrificing disease status, finance or productivity over each other when seeking to balance the system:

'You'd be cautious. If they are the cattle you really wanted, and they were exactly what you wanted for your system, you'd probably buy some. But [health status] would be at the back of your mind, "I don't want to overdo the price, I don't want to go mad, because if we do have a problem I am obviously going to be out of pocket." Yeah, you'd just be very cautious' (Edge 08)

Stretching the system too far may lead to cascading overflows requiring significant work to repair. At the same time, the balancing of different priorities such as production versus disease prevention, and the extent to which systems are stretched to accommodate new cattle, also enacts agricultural identities and forms of 'good farming'. We can see this in both the deliberate and accidental ways in which cattle purchasing stretches the system. Deliberate stretching occurs through anticipatory purchasing. In the following quote, a farmer describes how he will 'fill up' with cattle soon to prevent shortages. 'Filling up' is an anticipatory defence against market volatility but can also stretch the capacity of the farm – financially and physically:

'a couple of markets ago I had a pen come in, and I thought, you know, oh yeah, about £800, you know, they'll be all right. And... and they went up to £850. But now I... now I'm glad I bought them. I know I paid 50 quid more than I thought I wanted, but, you know, there's been nothing else since, so, you know. You know, and I must fill up now the next two or three months' (FG08)

Stretching may also occur due to affective overflows. As noted above, the look of cattle is important when assessing their fit to the system. In some cases, affective aesthetics overrides concerns for fitting the system: cattle are purchased simply because they 'look good':

'[Dad] wouldn't buy the best, but he would buy things he could see potential with, unless he saw them and it just caught his eye and he just really fancied it, and then he would buy it because he just fancied it, and that was it. You'd get a phone call, about two o'clock on a Thursday saying, "There's some cattle on the way." "How many?" "Oh, about 20." "Where am I going to put them?" "You'll find somewhere, you'll find a spare pen somewhere." "No, I won't, they are full." But we did, and that was about the gist of it' (Edge 08)

Alternatively, purchasing might reflect affectual relationships with other farmers who were experiencing difficulty in their farming and/or personal lives. Cattle were bought when they were not needed as a statement of solidarity and community, an act of doing a favour whilst performing the role of the good farmer who puts community before productivity:

"So, we went to his sale. Just to support the widow really. Well, of course, I ended up thinking I couldn't go and not buy something. And so, I ended up, not really meaning to, buying a most beautiful cow!" (Edge11)

Not all stretching is deliberate. Farm systems can be stretched accidentally through dishonest trading. Cattle trading or cattle dealers are viewed with suspicion and not good farmers (Hidano et al., 2019). Specifically, cattle traders who bought and sold cattle frequently were variously viewed as 'wide-boys' or 'dodgy', contributing to unnecessary circulations of cattle

around the country giving the impression that some cattle were from disease free areas when they were born in areas of high prevalence. Farmers' accounts of cattle purchasing recall disasters, near-misses and problems incurred after purchasing from dealers. However, other forms of dishonesty such as withholding information on disease status could also be found amongst friends:

'He shouldn't have sold [them]... he should have said to me... because I had known him for years. I think he was desperate, and he should have said, "thanks for showing interest, but don't buy these because I have concerns they have got problems", is what you should have done as a friend. So, I don't have a lot to do with him now. (HRA10)

6. Market Encounters and Market Displays

The purchasing strategies that evolve from the farm system find their use at livestock markets. Livestock markets represent a site of market encounter at which devices like purchasing strategies seek to organise and frame market activity. The strategies of fitting the system and stretching the system helps farmers prepare for these encounters, helping to organise which markets and cattle are relevant. At the same time, farmers are attentive to, and play a role in, a range of different activities and modes of calculation that rely on interpretive and cultural knowledges. It is this skilled work that allows markets to function.

However, these are not the only devices seeking to organise the market. As a site of market encounter, other activities and modes of calculation seek to organise the market, and entangle market participants in specific spatial boundaries, identities and moral-ethical frameworks. This is evident in the two broad categories of 'market display' found at livestock markets: backstage and frontstage displays. Backstage displays refer to the black-boxed technocratic devices that may be displayed on electronic screens or in market programmes. We refer to these as backstage displays because they are abstract representations whose calculations are largely hidden from view and computed in distant or placeless locations. Like other immutable mobiles, it is their abstract combinability that allows them to travel and mean the same in different places. By contrast, frontstage performances refer to in-person 'pitching' performances (Clark and Pinch, 1995; Kuiper, 1996) by farmers and auctioneers that attempt to attract and convince potential customers which rely on interpretive cultural

knowledges. Frontstage performances may be subtle and non-representational, and/or involve dramatic gestures and vocalisations. Either way, their purpose is the same: to provide a means to join two systems together. The extent to which these market displays work is explored below.

A repeated saying amongst farmers and auctioneers is that cattle purchasing involves buying ‘the man (sic) and the beast’. As such, frontstage displays are performed by both farmers and auctioneers with the aim of ‘pitching’ either the farmer selling cattle, or the cattle themselves. Although auctioneers may play a role in pitching the farmer, farmers themselves can do this during the auction. By entangling themselves in the process of the market, farmers’ market displays go a long way to distancing livestock markets from those designed according to neo-classical economic theory whose structural order physically separates buyer from seller and commodity. In fact, the physical infrastructure of livestock markets actively promotes entanglement. Market days are social days, or as one auctioneer described it, places in which agricultural actors are ‘coupled in’ literally but also metaphorically under one roof:

“[we have] everything under one roof, with what we call a "concourse area", whether you are going to the café or whether you are going to the loos or whether you are going to the sale ring, whether you are going to look at the pens, or whether you are going into the pay office. So everyone is criss-crossing all under one roof, it is dry and it is relatively warm, it even has heating. And so you've got traffic coming all the way and people seeing each other, and meeting and greeting and so forth. You haven't got to go along a route march to get to any particular part of it. It is all sort of quite nicely coupled in”
(Auctioneer)

So, if the beast ‘looked good’, what forms of market display could farmers deploy to ensure ‘the man’ (sic) was acceptably coupled to buyers? As noted above, legitimacy is a key factor in fitting the system. When sales are made privately, farmers can visit the farm they are purchasing from and make a visual assessment of the farm, drawing on the symbols of the good farmer. Farmers may also rely on non-visual signs: the ability of farmers to ‘speak farming’ and demonstrate their knowledge verbally by unpacking the complexities and uncertainties of backstage market devices, such as disease risk scores. Reluctance or failure to adequately explain questions about backstage devices would raise concerns about the fit of the animals in question and the potential for system stretching. Moreover, visiting the farm

would also demonstrate their interactions with their stock, which could be an important consideration when fitting the system:

'If he is a shouty, agitated sort of farmer, then the cattle are agitated as well, and it is very hard to get the trust up again, whereas if he moves nice and quietly among the animals, like the chap I bought the bull from, then I know... I don't want to inherit bad behaviour, because they are just too wary to be handled (HRA11)

The extent to which this can be achieved at the livestock market is limited and instead reputations may be relied upon. Nevertheless, farmers seek to entangle themselves in the market in at least two ways. Firstly, following Goffman (1959), farmers can (and are expected to) inhabit specific roles at the auction as a means of controlling interactions through a shared ethical order. These performative roles are similar to those described by Pilgeram (2007) in her account of female farmers' attempt to fit in with other farmers at livestock markets. This can include their style of talk, behaviour around animals and the clothes farmers wear to the market in order to present themselves as a productive successful farmer:

'The chap that walks in with a piece of baler twine holding his trousers up and sucking a piece of straw, he probably didn't get my bid to be blunt' (FG05).

A more significant market display comes during the auction itself. As a means of demonstrating one's 'good farming' credentials, farmers are allowed to stand in the auctioneer's box during the time his/her animals are being sold. This presence is a display of pride in one's work and togetherness both with the animal and the wider agricultural community. There is no requirement to be in the auctioneer's box, but 'standing behind your animals' is a means of taking the stage to demonstrate pride in one's work and signal a guarantee that the animals are genuine. Presence commits the farmer to an entanglement with the animal and the vendor beyond the moment of sale: if there are problems after the sale is complete, standing behind your animals represents a commitment to resolve them. In this way, presence in the box is a means to connect different farming systems, whilst signalling care to the wider agricultural community by demonstrating commitment to shared agricultural identities. Thus, absence from the sale provokes suspicion in the animals and the seller: that they are unreliable, transient and cannot be counted on to resolve any problems:

'buying every week, you get to think, those cattle have done well from that man with the red-hair...But if there's nobody in the box, you're very wary as a buyer...[in fact] we wouldn't have been bidding.

Because some of them will be dealers that have bought some in and then thought, no, we shouldn't have had this... and they don't stand behind it, so there's nobody in the box with it' (FG05)

'It is a visual sign. I often have new bundles of dairy cows, and they are coming from a way. They are reluctant to make the journey, and I am saying to them, "Well, actually it could cost you hundreds of pounds if you don't." Because the immediate reaction to the purchase, particularly if they have never shown in that market before, is, "Why is that man not with his goods?" And they will always draw the worst conclusion... it gives them confidence in what they are purchasing' (Auctioneer).

If the auctioneer's box is a stage to perform good farming, then it is generally a non-speaking role. Nevertheless, there are additional market displays that farmers perform in the auctioneer's box. In the opening vignette to this paper, a farmer held up a £10 note during the sale, but why would the seller offer money to potential vendors? Known as 'luck money', it is a form of cashback in which the seller provides the buyer with a small sum of money for each purchase, ranging from £2 for calves through to about £10 for older animals. Luck money is visibly held up by the seller standing alongside the auctioneer and is usually passed to the successful bidder by a drover.

For cattle dealers and traders, luck money is useful cash in hand, to cover after-market expenses. For most farmers, however, offering luck money is a performance of legitimacy, offering offer reassurance that the sale and seller is genuine. Luck money therefore reinforces the symbolic message of being present in the auctioneer's box. As one farmer commented, luck money 'gives you an indication that they are that type of person who likes to do things right' (HRA10). Similarly, auctioneers viewed it as an 'opportunity for people to show themselves' and a means 'to say "this is me, these are my cattle, hope you are going to [bid], thank you for your support"'. The amount of luck is significant: too much would suggest it was being used to artificially raise the price of an animal as a means of promoting one's farm business in the press by having the best sale at an auction. Too little luck and farmers might be seen as a 'miserable bastard' (FG 06) or worse, question a farmers' commitment to the agricultural community. A common story told by farmers was of starting to help their father by attending market to help with the cattle on sale and receiving luck money as a symbolic payment of entering and belonging to the agricultural community. Failing to offer luck money

could be perceived to breach traditional agricultural practices that form common identities.

For example:

'I stopped doing it, because it is wads of cash. If you put a couple of quid on every beast that's another £500 of money gone. And then somebody approached me...and his son was buying cattle, and his dad came over to me, he said, "Why no bloody luck then?" I said, "Look here, I sell 200 cattle a year, I am not making them all bloody lucky, you know the job." He said, "The job is hard enough. We pay good money for your cattle, you ought to make them lucky. Help a lad out, he's only 18 years old, bloody give him a drink so he can go to the pub tonight." It was on a Friday. I said, "Alright, I'll give him a five-pound note." And I thought just since then... and of course the cattle trade has gone through a really difficult time, and everybody is really tight, and so since then I have started putting luck back on cattle, because that father just tweaked my conscience a bit really' (HRA08)

It is not just farmers that perform these spatial identities through market displays, but auctioneers too. The role of the auctioneer is to ensure 'fair play' throughout the auction. However, disentangling themselves from the market is difficult in practice. Indeed, rather than seeking to establish separate identities from buyers and sellers, auctioneers position themselves within and as part of the agricultural and rural community. Thus, auctioneers described that their role involved 'caring' for both buyers and sellers: selling was not simply down to 'just walk[ing] in there casually [to] knock them off, and just take the [money]' because this would lead to a loss of faith amongst customers. Rather, successful auctioneers were part of their community and performed a shared identity.

One way in which the auctioneer displays his or her commitment to the farming community was through rhetorical performances, more generally referred to as 'patter'. As Clark and Pinch (1995) note, market traders are 'patter merchants' whose rhetorical skills are highly sophisticated that clinch sales through carefully chosen words, reflecting their intimate understanding of their customers' social worlds. Similarly, livestock auctioneers' patter is a market device which both produces the price of cattle, but also performs collective identity. Just as Kuiper (1996) observes, the livestock auctions attended followed a set pattern in which the auctioneer provided a brief description of the sale before opening the auction, interpolating bidding with information, then closing the sale. The auction involves more than calling the bidding but offers auctioneers the chance to display both their knowledge of cattle and their collective agricultural identity. For example, one auctioneer described how the

an auction can represent moments of care for the farmer, particularly if they are selling their life's work at a dispersal sale, and the animal itself. In professing their 'love' of cows and the plight of the farming family, the auctioneer was concerned to do the best for both of them. In practice this meant interpolating bid calling with key elements of information or highlighting certain traits that were exceptional. As Malley (2013: 259) notes, auctioneers' 'patter' follows a set rhythm and meter, but which is stopped for 'specific purposes and with specific effects'. This strategy was evident during a dispersal sale of a herd of dairy cows in which the auctioneer would break from narrating the rising price to deliberately and slowly exclaim using a tone of wonderment: '38 kilos! 38 ladies and gentlemen! Just look at her'. This interpolation was, of course, one way of driving up the price by referring to the cow's impressive milk production. At the same time, the invitation to 'just look at her' acts as a reminder of the ability to assess value from visual aesthetics common to good farmers. Auctioneers' patter is therefore an important market device in connecting systems. Patter performs an audible entanglement of care for the farmer and cow whilst also confirming the auctioneer's insider agricultural identity through its reference to the practices associated with good farming.

Auctioneers' entanglement in agricultural worlds was also demonstrated by their ambivalence to giving out certain kinds of information. Indeed, their frontstage displays act to displace backstage information produced by agricultural outsiders. Whilst auctioneers patter generally only involved giving out positive information, any known detriments would be declared. Sometimes this could be hard to extract from farmers but was necessary because 'there were no medals for trying to unscramble it afterwards' (Auctioneer). Indeed, contributing to a mismatch of systems was not in auctioneers' interests: just as farmers wanted to know if buyers and sellers were genuine, so did auctioneers. However, referring to quantified risk calculations of disease status was not part of the auctioneers' mid-auction interpolations. Compared to productive and affectual aesthetics, the information provided by formalised market devices betrayed the auctioneer's logic of a fair market. Thus, speaking about backstage disease risk metrics for statutorily controlled diseases like bovine tuberculosis, auctioneers said they would provide them if mandated, but otherwise would not mention it 'because it is through no fault of [farmers] that they are in a position of disadvantage'⁴. This principle of fairness, or procedural justice (Tyler, 2006), was relevant to

the market, but also signalled a spatial and cultural separation from the institutions of government perceived to be the problem in controlling disease (Enticott, 2008). As Smith (1989: 80) writes, fairness at markets is about more than the price, implying 'a governing principle of legitimacy grounded within the community'. The absence of information about disease history in auctioneers' displays therefore reflects this broader definition of fairness, drawing a spatial frame around insider and outsider biopolitical regimes, and in doing so serving to reinforce auctioneers' insider agricultural status.

7. Disentangling the Spaces of the Livestock Market

Despite occupying a central role in agricultural life and farming practices, there is surprisingly little academic research of livestock markets. We hope this paper stimulates further study and debate about the place of livestock markets in rural and agricultural spaces. Specifically, this paper directs attention to how cattle purchasing reflects Callon's (2021, p.261) suggestion that markets reflect a 'shared adventure' in which attachments are made through a diverse set of socio-technical arrangements. Both creating and navigating these market encounters requires skill and strategy as part of a process of 'qualculation'. The strategy of 'fitting the system' provides one way by which farmers can make sense of the qualities of the cattle on sale. At the same time, at the market place itself, market encounters are organised by performances of agricultural identity and good farming by farmers and auctioneers which are central to the way cattle and farmers become entangled. In doing so, market encounters therefore privilege some market arrangements at the expense of others and have wider implications for the attempts to control externalities such as animal disease.

In following the socio-technical arrangements of livestock markets and the work involved in buying cattle, the paper highlights two important aspects. Firstly, following other recent work on animal health (Hinchliffe et al., 2016), livestock markets can be imagined as borderlands in which exchanges re-engineer farm systems. Importantly, markets are not sites of easy exchange: boundaries are not neatly joined. Rather, as the paper shows, the livestock market is a site in which imperfect exchange takes place, reflecting the loosely coupled nature of farm and market systems. The resulting strategy of 'stretching the system' demonstrates how resilience and accommodation are key elements to maintaining the system. At the same time,

it reflects a fine balance: relegating disease qualities over production may store up and delay overflows, yet it allows farmers to maintain their system and identity as a farmer. In doing so, the paper contributes to the literature on biosecurity subjectivities (Shortall and Brown, 2020) as well as calls for good farming identities to consider 'the negotiated and embodied nature of good farming symbols' (Burton et al., 2021: 166). The complex set of relations implicated in cattle purchasing reveals not just how animals, technologies and embodied practices constitute the good farmer, but how these identities are spatial as much as individual.

Secondly, the paper has shown how livestock market encounters are organised by specific market displays. These performative displays connect different farming systems during cattle purchasing. If the process of valuing cattle is organised in response to fluid engineering, these market displays remove some (but not all) of the blockages preventing perfect alignment of the system. Entanglements such as these are what makes markets work. At the same time, these market displays frame the boundaries of the market in terms of the values of spatial and cultural identities. Thus, the display of luck money and presence in the auctioneer's box frames the market in terms of good conduct and 'good farming' which is reinforced by auctioneers' interpolations of productive aesthetics. There is no reason why auctioneers could not refer to backstage calculations in their interpolations: indeed, they are a further dimension of the open market's *homo economicus*. Their absence serves instead to highlight the geographical frame of livestock markets and how fairness is constructed in relation to interpretive and cultural knowledges. Thus, if livestock markets are borderlands, they lie not between proximate and distanced market regimes, but constitute an interface between different farms from across the countryside. In this way, market displays at livestock markets construct a 'power field of performance' (Caliskan, 2007, 2010) around rural and agricultural practices and identities.

The market is, of course, not the only way that cattle are purchased, nor cattle the only livestock traded in markets. Increasingly cattle are purchased online, whilst others are bought directly from farms or from dairy calf 'collection centres'. Findings from this paper may apply to these other purchasing contexts: all farmers engage in fluid engineering to maintain the system whilst the importance of good farming identities is relevant to all agricultural practices. These other purchasing sites and other livestock may implicate other market

devices, or rely more heavily on the forms of backstage displays and calculations that were discounted in accounts of market purchasing presented in this paper. Others, such as the use of online auctions require further study, both of their market practices and the social equity of digital agriculture (Rotz et al., 2019). At the same time, it is important to recognise that the practices encountered in markets in this research have their own geography: the use of luck money, for example, is more common to markets in the north of England than those in the south. The reasons for these geographical versions and the existence of alternative or replacement market displays should be explored in further research.

Finally, these observations of cattle purchasing and livestock purchasing have implications for agricultural policy, specifically animal health initiatives. The value of tracing the socio-technical assemblages that constitute farm systems and market encounters lies in highlighting the complexity of apparently mundane agricultural practice of cattle purchasing. This complexity means that backstage calculations such as metrics routinely used to highlight the risks of animal disease are not as significant in cattle purchasing as policy makers expect them to be. This raises questions about the effectiveness of biopolitical practices that ignore these complexities whilst seeking to normalise biosecurity practices and subjectivities. It may be that in other agricultural spaces and for specific farming systems, numerical displays play a more important role in guiding cattle purchasing. Even so, as Holloway (2005) describes, numerical modes of valuing animals' bodies may nevertheless be interpreted through socio-cultural lenses. Alternatively, it may be that for backstage displays to be relevant, the places in which they are used and the people who use them need to be more firmly entangled in their construction. Thus, in stimulating interest in livestock markets as important biopolitical sites, this paper will hopefully lead to greater scrutiny of different methods of engineering the circulation of livestock and the need to develop biosecurity policies that reflect the complex experiences of livestock farming.

Notes

¹ There is evidence of more studies of livestock markets in the global south (Turner and Williams, 2002; Greenough, 2010). Nevertheless, Gautier et al. (2016: 162) suggest that ‘their functioning as institutions has been understudied and scantily addressed in policy’.

² Farm system and Burton et al’s concept of ‘cowshed culture’ are broadly analogous, stressing the heterogeneous relations that constitute farms and configure action within them. We refer to farm systems as this was the term farmers themselves used during fieldwork, and its lack of emphasis on bounded and enclosed farm spaces.

³ Participant identifying codes at the end of quotations reflect locations (HRA or Edge) and method (FG for focus group). Supplementary information contains further methodological details and farmer characteristics.

⁴ For examples of these metrics see Adkin et al. (2016).

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