

Governing Animal–human Relations in Farming Practices: A Study of Group Housing of Sows in the EU

Michiel P. M. M. de Krom*

Abstract

EU pig welfare legislation required European pig farmers to shift from individual to group housing of pregnant sows by 1 January 2013. This requirement was principally designed to meet the sows' needs for locomotion and interaction with conspecifics. This article explores how the legislation affected everyday sow–farmer interactions, which influence farm animal welfare to an important degree. We start by analysing conceptualisations of sow welfare and sow–farmer relations as implicated in the EU directive and the scientific advice that informed it. Contending that these conceptualisations largely overlook co-developments in sow housing systems and sow–farmer relations, we subsequently introduce an alternative analytical framework that builds on sociological, practice-oriented theories. We then apply this framework to analyse 19 qualitative interviews with pig farmers in Belgium on the on-farm introduction of group sow housing. In this analysis, we discern different ways in which farmers' choices for particular group housing systems were co-constituted by and co-constitutive of everyday sow–farmer relations. We conclude by reflecting on the scientific and policy implications of these findings.

Introduction

According to Council Directive 2001/88/EC on the protection of pigs, EU pig holdings with 10 or more gestating sows may as of 1 January 2013 no longer permanently house these sows in individual stalls. Instead, gestating sows must be kept in groups from 4 weeks after insemination until 1 week before the expected time of farrowing. Like other European animal welfare policies (Veissier *et al.* 2008; Bock and Buller 2013), this legislation was adopted on the basis of animal scientific evidence:

Sows prefer to have social interactions with other pigs when provided with freedom of movement and environmental complexity. The current practice of keeping sows in continuous close confinement should therefore be prohibited (EU Council 2001).

Accordingly, the legislation was principally designed to improve sow welfare by meeting their needs for animal-animal contacts (Tuytens *et al.* 2008). At the same time, however, the legislation alters everyday animal-stockperson relations, which are known to influence on-farm animal welfare levels to an important degree (FAWC 2007; Hemsworth and Coleman 2011). In the light of these observations, this article raises two research questions. Firstly, what is the effect of on-farm implementation of the EU group sow housing legislation on sow-stockperson relations? And secondly, how may future farm animal welfare science and policy learn from an understanding of these on-farm developments in animal-stockperson interactions?

In seeking answers to these questions, this article examines the formulation and on-farm implementation of the EU group sow housing legislation. We begin by analysing the EU legislation and the underlying scientific advice on conceptualisations of the interconnections between sow housing system designs, sow behaviour and welfare, and the nature and quality of stockmanship. Concluding that these conceptualisations fail to attend to co-developments in barn interiors and animal-stockperson relations, we introduce an alternative conceptual framework that builds on social practice theories (Reckwitz 2002a; Schatzki 2002; Shove *et al.* 2012). We then apply this framework to analyse 19 qualitative interviews with Belgian pig farmers on the introduction of group sow housing systems on their farms. In doing so, we discern the different ways in which farmers' understandings and experiences of appropriate animal-stockperson interaction informed their choices for particular group housing interior arrangements, and how these barn layouts in turn restructured daily sow-farmer interaction. The article ends with a discussion of implications of these findings for future animal welfare science and policy, and a final reflection.

Group sow housing: science and policy

In the first EU directive that laid down European minimum standards for the protection of pigs, the then Scientific Veterinary Committee (SVC, now integrated in the European Food Safety Authority) was asked to draw up a scientific opinion on – among other pig welfare issues – ‘the welfare of sows reared in varying degrees of confinement and in groups’ (EU Council 1991, article six). Issuing its opinion in 1997, the SVC concluded on the basis of an extensive literature review that ‘serious welfare problems for sows persist even in the best stall-housing system’ in which sows are confined individually and, hence, unable to move around and socially interact with conspecifics (SVC 1997, p. 100). Accordingly, the SVC advised that ‘sows should preferably be kept in groups. However, only housing systems resulting in minimal aggression or injury should be used’ (p. 100). Aiming to define such systems, the SVC listed different design criteria for housing systems that help to minimise aggression and injury, centring on infrastructural factors such as stocking densities, types of flooring and feeding systems, opportunities for escape and avoidance, and opportunities to temporarily house sick or injured sows in individual pens. Concerning the role of stockpersons in safeguarding sow welfare, the SVC found that ‘The quality of stockmanship has large effects on the welfare of pigs in any housing system’ (p. 68), and that ‘Confined sows are easier to manage than sows in groups’ (p. 99). Based on

these findings, the SVC advised that each stockperson should be properly trained by providing information on ‘good pig handling procedures’ (p. 67).

Following the SVC opinion, in Directive 2001/88/EC (which was codified in Directive 2008/120/EC) the EU Council laid down the requirement to group-house gestating sows. Congruent with the SVC advice, the council specified different design criteria for group housing interior arrangements. As different types of group housing systems met these criteria, farmers were given some freedom to choose a system that matched their personal preferences and farm-specific circumstances. In relation to stockperson skills, the council recognised that when ‘pigs are kept in groups, appropriate management measures for their protection should be taken to improve their welfare’ (EU Council 2009, p. 5). To ensure that such management measures are taken, member states were made responsible for instructing stockpersons on – and monitoring on-farm compliance with – the general EU provisions on pig-rearing conditions. Furthermore, member states were required to ensure that ‘appropriate training courses are available. In particular such training courses must focus on welfare aspects’ (EU Council 2009, p. 7).

In sum, the EU requirement to group-house sows was principally informed by scientific evidence that, although better stockperson skills are subsequently required, housing sows in groups and giving them freedom of movement will better meet sows’ welfare needs than keeping them individually (Tuytens *et al.* 2008). Notably, while the SVC stipulated that managing sows that are housed in groups is more difficult than managing individually housed sows, both the SVC and the EU Council assessed the sow welfare impact of changes in housing systems and in sow–stockperson interactions in conceptually distinct ways. The on-farm introduction of group housing systems would directly affect sow welfare levels by facilitating changes in the sows’ behaviour and experiences. The consequences for sow welfare of changing sow–stockperson interactions would not depend on how group housing systems mediate the involvements of stockpersons and sows in these interactions but on stockpersons’ knowledge that may be improved through information provision and education.

When aiming to understand the origins of this separate conceptual treatment of sow–housing system interactions and sow–stockperson interactions, two important clues can be found in the types of research that underlie the SVC advice. First, the SVC explored the behavioural needs of sows by comparing their on-farm activities with the activities of their conspecifics in (semi-)natural conditions (SVC 1997, chapter 2). This common ethological approach is insightful and relevant as it can help to identify behaviour that is important to sows and their welfare (Spooler and Waiblinger 2009; Hemsworth and Coleman 2011). Yet it entails a risk of emphasising the sows’ ‘natural’ behavioural needs that are displayed in the absence of human interference with their lives, at the expense of attention to on-farm needs that arise in their daily interaction with stockpersons (Segerdahl 2007; Bock and Buller 2013). Using as a reference point the fact that in (semi-) natural conditions sows prefer to move in groups, sows’ behavioural needs are better met in group housing systems than in individual gestating stalls (see Fraser 2008).

Secondly, the SVC reviewed studies of animal–stockperson relations and their implications for animal welfare that have been conducted predominantly by animal

scientists and psychologists (Boivin *et al.* 2003; Schicktanz 2006; Burton *et al.* 2012). These scholars have consistently shown that the behaviour of stockpersons and their animals relate reciprocally: a careful handling of farm animals makes them less stressed and easier to manage, which encourages stockpersons to handle animals even more carefully, while an opposite, negative feedback loop may equally occur (SVC 1997; Hemsworth and Coleman 2011). To understand why stockpersons enter into positive or negative interactions with their animals, mainly cognitive approaches, such as those developed by Fishbein and Ajzen (1975) have been employed in which behavioural patterns are conceptualised as outcomes of individual attitudinal profiles (Boivin *et al.* 2003; Spoolder and Waiblinger 2009; Hemsworth and Coleman 2011; Hansson and Lagerkvist 2014). Consequently, recommendations to improve the quality of stockmanship typically focus on educating stockpeople on good animal handling procedures to facilitate an attitudinal and, concomitantly, behavioural change. Clearly, these studies represent important basic insights into the dynamics of animal–stockperson relations. Yet their cognitive orientation is problematic as it pays no attention to factors such as the embodied knowledge and emotions, and the social and material on-farm contexts that mediate stockpersons' behaviour to an important degree (Bock *et al.* 2007; Burton *et al.* 2012).

In short, the two research traditions that have informed the SVC report and the EU sow welfare legislation do not attend to the embodied and contextualised experiences of animal–stockperson relations. Consequently, these research traditions overlook 'processes of co-constitution in which technologies and their "users" make and remake each other' (Holloway *et al.* 2014, p. 132; see also Oudshoorn and Pinch 2003); in other words, how the farm-specific, lived experiences of animal–stockperson relations may inform and be affected by the implementation of the EU group sow housing legislation. Without paying due attention to these factors and their impact on farm animal welfare, the explanatory potential of the research traditions is limited, possibly leading to unintended and undesirable on-farm consequences when they inform animal welfare policy. In the remainder of this article we empirically explore these consequences with the use of the conceptual framework outlined in the next section.

Conceptualising animal–stockperson relations: a practice approach

To gain a more contextualised understanding of sow–farmer dynamics, an analytical framework is required that enables us to gain insight into the on-farm interplay between barn interior arrangements, stockpersons and sows. As contended by different scholars (Boivin *et al.* 2003; Schicktanz 2006; Burton *et al.* 2012), sociology may make an important contribution to understanding animal–stockperson relations. Yet, arguably led by the traditional humanist focus of social science (Bock and Buller 2013), sociologists have tended to recognise farm animals conceptually only as symbolic categories in societies' cultural representations or as objects of instrumental value (Tovey 2003; Holloway 2007). Consequently, sociology has rendered the sentience of farm animals and their inter-species relationships with humans largely invisible (Buller and Morris 2003; Tovey 2003). Although sociologists such as Holloway (2001), Wilkie (2005) and Finan (2011) have started to explore how farmers

handle their ambivalent – that is, caring yet instrumental – relations with their animals, the anthropocentric focus of these studies gives only a limited insight into how animals and humans interact in particular farm contexts and co-constitute each other's behaviour and experiences (for notable exceptions, see Burton *et al.* 2012; Holloway *et al.* 2014).

To allow for an analysis of stockpersons and sows as co-constitutors of embodied and contextualised animal–stockperson interactions, we propose to build on practice theories as developed within sociology since especially the 2000s (Schatzki 2002; Reckwitz 2002a; Spaargaren 2011; Shove *et al.* 2012). We do so by starting from the recognition that stockpersons principally gain an understanding of their sows' health and welfare needs in their everyday practical engagement with their sows (Segerdahl 2007; see also Carter and Charles 2011). This engagement quintessentially involves sensory-based assessments of sows' bodily conditions and behaviour, on the basis of which stockpersons may adjust their caretaking activities and barn interior arrangements to improve their sows' health, welfare and productivity (Dockès and Kling-Eveillard 2006; Spooler and Waiblinger 2009; Burton *et al.* 2012). Sows in turn adapt their behavioural repertoires and preferences to their specific on-farm environment, of which the caretaking activities of stockpersons are an integral part (Segerdahl 2007). This all implies that stockpersons and sows develop a mode of on-farm interaction by adjusting to each other's activities and behaviours in daily sow farming practice.

Practice theory allows for an understanding of such everyday sow–stockperson dynamics by placing the practice in which these dynamics play out at the centre of analysis – instead of examining attributes of individual stockpersons, such as attitudes, or relations between sows' intrinsic behavioural needs and the physical environment in which sows are housed. Following Reckwitz (2002a, p. 249), a practice can be defined as 'a routinized type of behaviour which consists of several elements, interconnected to one other', including most essentially 'forms of bodily activities, forms of mental activities, [and] "things" and their use' (see also Shove *et al.* 2012). Translated to sow farming practices (and in our case, more specifically to the practice of managing sows, in the period between insemination and farrowing), these elements include:

- stockpersons' bodily movements (for instance, the daily feeding of sows, visual inspections of sow health and welfare) and the meanings that stockpersons attach to caring for sows (including the goals and joys of sow farming, and understandings of how sow welfare can be secured)
- sows' bodily movements and welfare needs and experiences
- the material settings that enable and constrain the ways in which the stockpersons and sows act and interact.

The everyday, routine nature of the on-farm interplay between these elements serves as a facilitator and 'activator' of particular behaviour and experiences of stockpersons and sows, while making others more difficult or disruptive and thus unlikely (Schatzki 2002). In this way, the dynamics of a sow farming practice contain and co-constitute the capabilities and preferences of stockpersons and sows, rather than only the other way around (Reckwitz 2002a; Spaargaren 2011). That is to say,

translations of stockpersons' attitudes and sows' biological needs into on-farm behaviour come to depend on how these attributes are integrated within the routinised configuration of sow farming practices, rather than on the characteristics of these attributes in and of themselves (Shove *et al.* 2012).

Likewise, the successful on-farm introduction of a group sow housing barn interior comes to depend on 'the levels of fit or misfit the new [housing systems] show with respect to the existing portfolios of objects, bodies and meanings involved in the practice' (Spaargaren 2011, p. 817; see also Reckwitz 2002b; Schatzki 2002). More specifically, farmers' choices for particular group housing systems are likely to be informed by how these systems fit in with the existing material settings on their farms, and with farmers' practical, experience-based understandings of how infrastructural characteristics enable or constrain their productive interactions with and between their sows. Furthermore, on-farm changes in barn interiors will not only affect the dynamics of a sow farming practice, based on how stockpersons conceive of these changes or in meeting intrinsic behavioural needs of sows, but also based on how these changes affect and become appropriated in the pattern of interactions between sows and stockpersons.

In sum, we conceptualise stockpersons and sows as co-practitioners of farm-specific sow farming practices who enact and amend these practices by interactively performing and integrating its constitutive elements. In doing so, we recognise that sows and stockpersons differ in analytically significant ways in terms of their capacity for reflective thought and for sustaining or inciting changes in sow farming practice (see Carter and Charles 2011): stockpersons can decide to introduce a particular group housing system on a farm, and whether sows are to be housed on a farm in the first place. At the same time, our conceptual framework emphasises that the practical involvement of stockpersons and sows in sow farming practice are to an important degree a relational outcome of their shared history of participation in farm-specific sow farming practices. Accordingly, to grasp on-farm effects of the European group sow housing legislation, we must gain empirical insight into how its 'interventions have effect (some intended, some not) within and as part of the ongoing dynamics of [sow farming] practice' (Shove *et al.* 2012, p. 245) in which sow behaviour and welfare experiences, the behaviour and experiences of farmers, and their mutual interaction are enacted and reproduced.

Methods

To empirically explore how the EU group housing legislation affected on-farm sow-stockperson relations, we interviewed and made observations in the group housing systems of 19 Belgian pig farmers. The interviews and observations took place between April and November 2013, which is 4 to 11 months after the deadline by which sow farmers had to convert to a group housing system. Given our aim to explore on-farm dynamics in relation to a European animal welfare policy, the interviews were conducted in Belgium, which is one of the EU member states that has set pig welfare laws at the level of the European Directive 2001/88/EC, without introducing additional measures or more stringent time schedules (Van Gansbeke *et al.* 2011).

Table 1: *Number of interviewees according to age, number of sows, the year in which the farmer converted to group housing, and the type of group housing system*

Farmer no.	Age	Number of sows	Introduction of group housing	Group housing system
F1	43	140	2012	Free-access stalls
F2	43	130	2012	Free-access stalls
F3	42	120	2012	Free-access stalls
F4	42	180	2011	Free-access stalls
F5	43	250	2011	Free-access stalls
F6	57	115	2011	Free-access stalls
F7	31	300	2010	Free-access stalls
F8	40	325	2009	Free-access stalls
F9	58	350	2006	Free-access stalls
F10	50	90	2006	Free-access stalls
F11	58	100	2009	Free-access stalls & alternative system
F12	49	150	2012	Alternative system
F13	56	100	2007	Alternative system
F14	20	400	2007	Alternative system
F15	45	400	2009	Alternative system
F16	37	800	2006	Alternative system
F17	34	350	2010	Alternative system
F18	54	140	2006	Alternative system
F19	62	240	2007	Alternative system

Our sample of 19 farmers is not meant to be representative of all Belgian sow farmers, but it does include diversity in key variables that have been found to affect animal–stockperson relations so as to avoid an undesirable bias in our data (Table 1). These variables are the age of the farmer (Burton *et al.* 2012), the number of animals per farm (Boivin *et al.* 2003; Tuytens *et al.* 2008), the year in which the farmers converted to a group housing system (and thus their years of experience in working with the new system), and types of group housing systems (Tuytens *et al.* 2008, 2011).¹ With respect to types of group housing systems, we differentiated between free-access stalls (individual feeding stalls that sows can enter at will, combined with a free-range area), and alternative systems (in which no stalls are present).² This analytical distinction was based on the observations of animal scientists such as Tuytens *et al.* (2011) – which were frequently corroborated by interviewees – that free-access stalls require relatively few sow management adaptations because this system closely resembles the housing of sows in individual gestating stalls, whereas alternative systems without individual stalls necessitate a more substantial re-adjustment by both farmers and sows. We ceased to interview farmers at the point of data saturation (Mason 2002), that is, when the information obtained in the interviews no longer contributed to our understanding of why farmers opted for a particular group housing system, and of how the on-farm introduction of this system affected everyday sow–stockperson relations.

Farmers were questioned with the aid of a semi-structured interview guide that dealt with: (i) the reasons why farmers had opted for a particular group housing

system; (ii) farmers' bodily activities, the motivations and knowledge involved in providing day-to-day care to gestating sows and changes in these factors after converting to a group housing system; and (iii) farmers' observations of their sows' behaviour and welfare before and after converting to a group housing system. All interviews took place in farmers' homes or gardens and were combined with visits with the farmers to their group housing systems. These visits allowed us to observe and ask for clarifications on issues that had been discussed during the interviews, and thus enhance our understanding of situational factors that governed sow–stockpersons relations (Mason 2002; Holstein and Gubrium 2005). At the same time, our visits enabled farmers to clarify and demonstrate sow behaviour and stockmanship knowledge and skills that are embodied and tacit rather than discursive and that had, accordingly, not been exhaustively discussed during the interviews.

All interviews were taped and fully transcribed; in-barn observations and discussions were recorded in field notes. The analysis of the interview transcripts and observational data focused on the reasons why farmers chose a particular type of group housing barn interior layout and their references to the involvements of sows (in terms of bodily movements and health and welfare experiences) in farming practice and of themselves (in terms of bodily activities, understandings and motivations) before and after the conversion to a group housing system.

Group sow housing and sow–stockperson relations: empirical explorations

In the following four subsections we discuss our empirical findings. We begin by setting out the reasons why farmers chose particular group housing system designs. Subsequently, we recount changes in the involvement of sows and of farmers in everyday sow farming practice following on-farm introductions of group housing systems. The last section under this main heading discusses sow–farmer dynamics and their implications for sow welfare under conditions of group sow housing.

Understanding farmers' choices for a particular group housing system

In line with the findings of Tuytens *et al.* (2008, 2011), who conducted longitudinal surveys into Belgian farmers' responses to the EU group sow housing legislation, most interviewees argued that investment costs were a key criterion when they selected a group housing system. These farmers preferred a low-investment option because they planned to retire within a few years and had no successors, because their financial situations gave them no other option or because farmers are businesspersons who simply have to make economically rational decisions. To reduce investment costs, interviewees reported, they re-used their old individual gestating stalls in a free-access stall system, chose an alternative system involving few costly materials, or decided to renovate their old barns instead of building new ones. Decisions to renovate barns co-determined housing system choices because all interviewees aimed to continue farming with at least an equal amount of sows, which led renovating farmers to select a free-access stall or alternative system that enabled them to do this within the given infrastructural constraints: 'I wanted to stay within the existing dimensions of the barn. And this was the only system that actually made this possible' (F13).³

The degree to which farmers' housing systems choices were economically rational should, however, not be overstated, because the interviewees faced difficulties in finding reliable information on the basis of which they could make an economically rational choice. Government agencies explained that differences in investment costs between most types of housing systems were relatively small. Therefore, farmers were advised to choose a system that suited their personal management styles and farm-specific situations (Tuytens *et al.* 2011; Van Gansbeke *et al.* 2011). For farm-specific advice, farmers principally relied on representatives of feed companies and barn manufacturers, whose information was considered useful but was treated with caution because their information was likely to be commercially biased. Peers represented a third source of information. Yet interviewees argued that pig producers preferred to keep up appearances rather than providing accurate information to their colleagues. Consequently, interviewees principally relied on their own knowledge and experiences when selecting a housing system: 'You may listen to anyone you like, but you have to make your own decision' (F1) and 'since every system has its pros and cons ... you have to choose what you prefer or think is best' (F4). And this knowledge and experience had to an important degree been shaped in their everyday, embodied and materially contextualised interaction with their sows.

Core daily sow management tasks involve feeding and visually inspecting sows for signs of underfeeding or overfeeding, abortions, sickness and injuries. Farmers tend to perform these two management tasks together, as during feeding time all sows are (supposed to be) active, which facilitates the detection of health and welfare problems. Interviewees who had converted to free-access stalls (which contain individual feeding stalls) indicated that they preferred this system over alternatives because it allowed them to continue their feeding and observing routines while the sows were physically separated from their conspecifics. These farmers thus opted for a system that fitted in with their experience-based understanding that productive sow–farmer relations are fostered by the possibility to 'more or less keep individual control over sows' (F4). Alternative systems were, according to these farmers, likely to constrain their capacity to adequately manage their sows' health and productivity:

... a big group without any stalls ... Well, personally I would get anxious about that because I could not keep a proper eye on my sows.... Perhaps it would have cost me less but I didn't dare to do it. (F2)

These farmers additionally favoured a free-access stall system because it facilitated an easy individual confinement of (large segments of) their herd of sows. Some farmers made incidental use of the possibility of confining their sows in the feeding stalls when the latter needed to be vaccinated or dewormed (for instance, F4). Others confined their sows each night to ensure that morning feeding and observing routines could continue as before (F7, F10), or permanently confined smaller groups of sows when it proved difficult to adequately manage the health of all gestation sows in groups (F2, F8).⁴

Farmers who chose alternative group housing systems (in which no stalls are present) did so in part because they had found – in their daily work,⁵ or during visits to other farms – that stalls actually hindered effective and efficient sow management. This was largely related to the daily visual inspections of sows. Interviewees indicated

that individual feeding stalls physically obstruct a clear view of their sows. More importantly, free-access stalls require the farmer to walk past each stall to observe each sow while feeding, while observing sows that move and feed in a group allows for the easy detection of deviating behaviour – which is the most evident indication that a sow needs extra attention (F14, F16). Interviewees additionally preferred alternative group housing systems because they do not contain as many ‘moving parts as, for example, free-access stalls, which mostly involve hinging iron fences or doors that clatter all day long’ (F15) that would cause stress to both the farmers and the sows. Finally, some interviewees thought that free-access stalls insufficiently address public animal welfare concerns that were intended to be met by the EU group-housing legislation. In keeping with this idea, these interviewees chose an alternative system that they considered more socially sustainable and therefore less likely to be prohibited in the short run (F14, F16, F17).

The dynamics of group sow housing: changing sows

Pigs that live in groups develop a social dominance hierarchy. Once introduced into a group with unfamiliar conspecifics or within an unfamiliar environment, they fight to establish a social rank that particularly affects their feeding behaviour (SVC 1997). According to farmers’ observations, their sows had to learn collectively how to effectively establish and maintain a group hierarchy. This became evident when farmers began to group-house their sows. Fights for dominance proved to be particularly fierce and long-lasting, resulting at times in severe injuries or even deaths among sows. In successive reproductive cycles (when sows were being regrouped after having farrowed and having been inseminated again), most sows determined and sustained the group hierarchy with markedly less aggression – ‘as if they realised, okay, we will have to come to an agreement’ (F13). Sows had additionally learned how to adapt to group housing environments in interplay with the farmers. This had become most noticeable in feeding situations:

Sows are creatures of habit. They are used to getting fed in the morning at a specific time ... and when they do not get it at that time, they become agitated. (F2)

As a result of changing feeding routines, said one farmer, his sows

... fought more and searched more [for feed] the first time that those groups were formed. But now, if I regroup them, they know when and that they all get fed and where to look for it. (F5)

Along with the aforementioned inter-species and intra-species learning processes, the spatial characteristics of group housing systems shaped sows’ in-group behaviour. Capturing the experiences of most interviewees in this respect, one farmer stated:

Many systems are being built that actually still contain stalls, and what do we see? That the sows do come out now and again, especially to defecate. But then they re-enter a stall because they actually feel safer in there than when moving in the group. In [alternative] group housing systems that [fear for conspecifics] is totally gone. The sows get more used to each other. (F14)

Most interviewees with free-access stalls attributed their sows' behaviour to an innate desire to rest in a secluded environment. A minority of these farmers argued, however, that their (renovated) barns provided their free-ranging sows too little space to avoid or escape aggression and disturbance by other sows, causing their sows to seek the seclusion of the stalls. Likewise, and contrary to the idea that sows necessarily become sociable in alternative systems, an interviewee with an alternative system argued that his sows should have 'a double amount of space [to] allow them to flee' (F12) and avoid the continuous fights that occurred on his farm. Such larger amounts of space affected not only sows' aggressiveness but other aspects of their behaviour as well. For instance, one interviewee's sows tended to defecate and sleep at seemingly random places, but, he stated, 'sometimes I give them two pens: six sows in a double amount of space. And then they really create, here for instance, a nest to cosily do a nap, nice and clean' while reserving another specific area of their living environment to defecate (F13). These observations indicate that sows' in-group behaviour was mediated by both the (free-access stall or alternative) type of group housing system, and the farm-specific layout.

Sows not only adapted their behaviour to their new environments, but the types of sows that were housed in groups were also adapted to the characteristics of these environments. The interviewees indicated that they and their sow suppliers were more or less systematically taking out of production sows that were maladjusted to living in groups. Frequently mentioned maladjustments were an excessively aggressive personality (see also SVC 1997) and an injury-prone leg anatomy – both of which became particularly problematic when sows started to interact socially and move in groups. Careful selection of sows that were group-housed and used to breed future generations of gestation sows helped to reduce on-farm animal health problems:

It seems that I lost a few more sows due to claw lesions [in the group housing system than previously in individual gestating stalls]. But that could easily be different next year, if the weakest ones are eradicated now.... That's a sort of form of natural selection, so to speak (F11).

So while the group housing legislation was designed to adjust sow environments to sow welfare needs, on-farm introductions of group sow housing triggered adjustments of the subjectivities and bodily capacities of sows to group housing conditions (Holloway 2007).

The dynamics of group sow housing: changing stockmanship

After converting to group sow housing, farmers had to learn to work with different management variables that mediate the health and productivity of group-housed sows: such as the sizes of the groups; variability in the age and bodily strength of the sows that are grouped together; the timing when sows are grouped; whether and when new sows are introduced into established groups; when particularly aggressive, sick or injured sows are taken out of a group; and the interior layouts of group pens. The interviewees argued that finding out which configurations function best involved a process of trial and error, because the effects of the above variables on sow health and productivity are to an important degree a relational effect of the farm-specific

configurations of sow farming practice. That is to say, since 'each barn is built differently in Belgium' (F12) and 'a pig can grow up totally differently in different barns' (F16), 'you can only learn how to really do it [develop good management skills in one's housing system] once you have started to do it' (F17). And this learning by doing hinged on making daily observations of sow health and productivity, and 'when that deteriorates, asking yourself: why did that happen? And then really work at it to prevent it from happening again' (F7).

Changes in farmers' daily observational routines following conversions to group sow housing differed, in part due to the different types of group housing systems they used. Farmers with free-access stalls tended to consider that these changes were small as they could continue to visually inspect their sows when they were feeding in individual stalls. Some farmers with alternative group housing systems, in contrast, considered it much easier to adequately observe their sows in their new system. These farmers had become 'more acquainted with the behaviour of sows that move freely [than of] sows that stand in a row of stalls' (F15), which facilitated the detection of deviations in sow behaviour that indicated health and welfare problems. A minority of both the farmers with free-access stalls and the farmers with alternative systems, however, complained that their daily observational routines had become more complicated because they could no longer 'keep track of individuals' (F6):

If one [sow] skipped a meal [when being housed in an individual gestating stall], then you knew because the trough was not empty. But now another [sow] eats it. Well, it may easily take 3 days before you know that a sow isn't eating anymore (F6).

Such different experiences using similar types of housing systems were to an important degree determined by the farm-specific designs of these systems. Some farmers had shifted from hand-fed to automatic feeding systems when converting to a group housing system. For one, this meant that

... you do win out some time because you do not have to do it [give feed] manually. But on the other hand, you still need to check whether ... they have all eaten. When you feed them manually, you see at once [but] now you need to specifically look out for it. (F3)

Furthermore, most interviewees indicated that their group housing system designs obviated the need to muck out the barns daily, which used to allow the farmers to observe each sow closely along the way. These infrastructural changes thus disconnected the daily observations from other routine management activities.

The farmers' willingness to invest time in such specific observations was largely informed by their freedom of movement within the barns – which in turn principally depended on whether they worked in renovated or newly built barns. Farmers who had built new barns ensured that they could move easily through them and thus observe their sows comfortably and with pleasure. Some farmers who had renovated their old gestation sow barns had instead compromised on their own working space to keep the same number of sows as before the conversion (F1, F6, F8, F13). This resulted in situations in which 'I can only *just* fit in my passages, while earlier on I had enormously wide passages where I could work easily ... Almost every day this stresses me out' (F6). Having forfeited much of the pleasure in their work, these farmers admitted they sometimes 'just close the barn door and leave them [the sows]

be' (F8) even when they felt obliged to keep an eye on their sows. With observations being a cornerstone of good sow management, these farmers found it difficult to improve and maintain the well-being and productivity of their group-housed sows.

What is more, farm-specific barn designs affected farmers' readiness to manage sow health and welfare problems after having detected them. Again, differences between renovated and newly built barns stood out in this respect. Most farmers who worked in newly built barns considered removing sows from a group a simple management task as they and their sows had ample space to move about, and several of these farmers had gained an instrumental understanding of their sows' movement patterns: 'If you know how they will react and to which side they will move, then it is easy to rout them out' (F16). In renovated barns, conversely, it often proved laborious to temporarily isolate sick or injured sows because the barn interior layout hindered the movements of both the farmers and the sows. This demotivated farmers to take action:

If you need to take a sow out of [a group], then you need to close all those stalls [to lock up all other sows to prevent them from obstructing the movement of the farmer and the sow that is to be removed from the group]. And afterwards, when you have relocated that one sow, then you have to re-open all the stalls ... Well, that's something ... you spare yourself the trouble. If it's only for one sow, you think: perhaps it [the sow's health] will have improved by tomorrow (F1).

The dynamics of group sow housing: changing sow–farmer relations and their implications for animal welfare

Having discussed farmers' choices for particular group housing barn interior layouts and the dynamic involvements of sows and farmers in group housing practices, in this section we draw these empirical findings together. We do so by distinguishing three analytically distinct configurations of interrelations between group housing system designs, sow behaviour and welfare, and the nature and quality of stockmanship. In particular, we focus on how group sow housing conditions affected patterns of interaction between sows and farmers, and farmers' understanding of and motivation to improve the welfare of their sows in everyday sow farming practice.

Firstly, in most free-access stall systems, everyday sow–farmer interactions differed little from their former relations in individual gestating stall systems (most notably F2, F3, F4, F7, F9, F10). While both the farmers and the sows had initially needed time to learn to adapt to the new situation, they soon resumed daily routines that closely resembled those they had followed before the group housing period. The farmers remained able to 'more or less keep individual control of their sows' by visually inspecting them when the sows were feeding inside the stalls, and their sows preferred to stay in the seclusion of these stalls for the better part of the day. In view of these small changes, some interviewees did

not see a difference [in sow welfare]. And for me it is all the same. So it was a useless investment. It was only to comply with the law. (F10)

Others were slightly more positive: 'I don't think that the welfare of the animal has changed much, except that she can now stretch her limbs once in a while' (F3). Still,

these farmers welcomed such small welfare improvements because, like most of their colleagues, they equated sow welfare with sow productivity (Dockès and Kling-Eveillard 2006; Skarstad *et al.* 2007; Vanhonacker *et al.* 2008): 'If a pig feels well then it performs well ... If it feels well in a group, then I have nothing against [group housing]' (F11).

Secondly, negative sow–farmer dynamics played out in a number of the group housing systems that were installed in renovated barns (F1, F6, F8, F19). The designs of these systems tended to inhibit the farmers' in-barn movements, which diminished their working pleasure and demotivated them from spending much time on observing their sows daily. The resulting lack of insight into the day-to-day well-being of each of their sows was reinforced because these farmers failed to 'distinguish [between their sows] by their looks. They are all plain white. We can only recognise them by their [eartag] number' (F1). The conversion to group sow housing thus complicated the tracing of individual sows though time:

We used to know: that sow which had somewhat lost her appetite is over there [in a specific individual gestating stall]. And now, well, today that sow sits over here and tomorrow somewhere else (F1).

This de-individualisation of the sows in the farmers' eyes complicated the timely detection of sow welfare problems that merit their intervention. Furthermore, it desensitised the farmers to their sows' subjectivity and individuality (Buller and Morris 2003; Bock *et al.* 2007), which made it easier for the farmers to detach themselves emotionally from their sows and 'just close the barn door and leave them be', even if the farmers 'do not consider that doing so is a positive thing or contributes to animal welfare' (F1).

In some of the above cases, such emotional detachment was amplified because the sows tended to fight and injure each other often, due to limited space to avoid aggressors and, arguably, to the farmers' lack of effort to improve the sows' in-group living conditions. These hostile relations between the sows meant that a sow

may all of a sudden lie down [injured] and you don't know what happened ... that does not improve animal welfare, and does not make it nice for us to work anymore either. (F8)

These sow–sow dynamics not only diminished farmers' working pleasure, but they also caused farmers to criticise the aggression unleashed by their group housing barn interior layouts as an obstruction to sow welfare and productivity. In these circumstances their sows changed from subjects that demanded good stockmanship into subjects that frustrated good stockmanship. In view of such negative dynamics, and the related observation that their sows' productivity 'doesn't diminish spectacularly but there is less production' (F8), these farmers argued that group sow housing 'wasn't good for the farmer and it wasn't good for the pig either ... in the way in which we implemented it' (F19).

Thirdly, positive sow–farmer interactions were fostered in alternative group housing systems – and a minority of the free-access stall systems – that were situated in spacious and mostly newly built barns (most notably F7, F14, F16, F17). These

structures enabled the farmers to observe their sows in comfort and the sows to exhibit individual behaviour by moving around and (refraining from) interacting with conspecifics. Farmers' observations of such individual behaviour facilitated the detection of sow welfare problems as it allowed them to focus on any divergence in behaviour from the routine. Furthermore, as farmers gained knowledge of their sows' behavioural inclinations, they began to apply it to manage individual sows' health problems (for instance when removing them from a group by anticipating their bodily movements) and of other routine tasks (like cleaning out the barn by directing the sows' defecation behaviour through the barn layout). Such anticipations of the sows' behavioural preferences reduced the unpleasantness and stress of these management procedures for the sows and the farmers, thus contributing both to sow well-being and the farmers' working pleasure.

Such a positive sow–farmer interplay was reinforced when, in observing their sows' individual and subjective behaviour, the farmers began to empathise with their sows (Burton *et al.* 2012). That is to say, by recognising their animals' independent actions, the farmers began to draw parallels between sow and human behaviour:

They are individuals, certainly, just like humans.... It's always the same ones that are recalcitrant, that grunt once in a while or that stand up all the time and look around. And it's always the same ones that lie down (F7).

Furthermore, the farmers began to recognise their sows' independent preferences, such as when

... seeing a sow leaving the lying area with straw in her mouth ... That's actually funny to see. They're not supposed to take it out of there, but on warmer days it happens: then they move to cooler places to lie on the straw over there. (F17)

These recognitions motivated the farmers to imagine themselves in their sows' situation when coming to a management decision, for instance by asking themselves:

How would you feel as a human being under those circumstances?... I would rather lie on straw than on concrete. And I think that it's the same for sows. (F14).

Such efforts to treat their sows humanely benefited not only the sows but also the farmers since 'an animal must feel well also to perform well ... That's just the same as with a human being' (F17). Moreover, farmers considered the act of observing healthy, vigorous sows in their barns to be intrinsically gratifying, like

... when my wife is all dressed up to go to a party, and I think: well, do I have a handsome wife!... That's a very strange comparison: comparing a woman with a pig. But it's that kind of satisfaction. It doesn't bring you any economic benefits, but it does make you proud. (F16)

In view of such positive experiences, these farmers had given up their initial opposition to the group housing legislation. Whereas one farmer used to be critical of this legislation:

... because I was principally thinking from an economic perspective ... [I] didn't really consider it problematic anymore once I learned to work with the system and it began to run effectively, and it also showed in the [increased fitness of the] animals. (F16)

Another farmer even became:

an advocate of [group sow housing]. We work very well with it ... and I even think that the comfort for the sows will pay off in the [economic] results. (F14)

Discussion

To improve sow welfare, EU legislation obligated pig farmers to introduce group sow housing according to specific infrastructural design criteria by one European-wide deadline. Our analysis of this policy design revealed that the policy was first and foremost informed by appraisals of a direct relationship between physical structures and sow behaviour and welfare. The effects of the legislation on everyday sow–farmer relations were considered to be dependent upon farmers’ knowledge and attitudes that are more or less manageable through provision of information. Being built on analytically distinct understandings of sow–housing system interactions and sow–farmer interactions, the EU legislation aimed to govern sow welfare from *outside* sow farming practices, by making top-down changes in sow housing systems on the one hand and farmers’ attitudes on the other.

In this article we have instead explored how the group sow housing requirement became implicated *within* the emergent patterns of interaction between sows, farmers and the material structures of sow farming practices, which are marked by routine behaviours and understandings, socio-material and economic histories and path-dependent trajectories (Reckwitz 2002a; Spaargaren 2011; Shove *et al.* 2012). In doing so, we have observed that farmers’ practical, experience-based understandings of good animal–stockperson relations informed – most notably with farm-specific economic conditions – farmers’ choices of housing structures. Moreover, we have shown that the effect of the on-farm materialisations of these choices on sow–farmer relations differed, in the long run, in at least three analytically distinct (that is, negative, neutral to moderately positive, and positive) ways, according to whether and to what degree the novel barn interior arrangements allowed and motivated sows to portray, and farmers to perceive and act upon, subjective and individual animal behaviour and needs.

Our findings reveal that the EU legislation did not reconfigure sow farming practices and their animal welfare impact so much as it did the elements of these practices, including, most notably, their material settings. The on-farm form and functioning of the required material change hinged on how it could be and was actively integrated by farmers and sows within the existing configurations of farm-specific practices. This indicates that the impact of the legislation was not chiefly predetermined by the degree to which infrastructural criteria meet sows’ natural or intrinsic welfare needs, but was rather an outcome of how farmers and sows (inter-)actively responded, and became subjected to the legislation from their practice-specific, dynamic roles and positions. Indeed, to the extent that sows with particular bodily characteristics and personalities were being (de)selected to enter group sow housing systems, the subjectivities and intrinsic welfare needs of group-housed sows were themselves outcomes of on-farm implementations of the legislation (Holloway 2007). Along similar lines, farmers’ understandings and enactments of appropriate

sow care (and concomitant impacts on animal welfare) were not simply premised on farmers' individual attitudes and abstract knowledge, but were at least to an equal degree a recurrent outcome of farmers' embodied and materially contextualised, everyday interaction with their sows (Burton *et al.* 2012).⁶

The above reflections are not intended to normatively evaluate the on-farm impact of the EU group sow housing legislation on sows and farmers. The point that we want to make is that, rather than being the unmediated results of a top-down intervention, the legislation's on-farm impact depended on how the group housing requirement became implicated in the on-farm dynamics that it aimed to steer (Shove *et al.* 2012). Failure to anticipate this dynamic integration of legislation in on-farm contexts means that opportunities are being missed to work towards preventing negative and promoting positive animal–farmer relations and concomitant animal welfare impacts when designing animal welfare policy.

Most fundamentally, then, our study underlines a need to rethink the current focus in animal welfare science and policy on infrastructural criteria like space allowances and on allowing for freedom of movement and social interaction between animals without attending to emergent co-developments in barn interior layouts, animal–farmer relations and the well-being of animals and farmers (see also Veissier *et al.* 2008; Burton *et al.* 2012; Bock and Buller 2013).

At a scientific level, this suggests a need for more on-farm research into how (potential) animal welfare interventions mediate the involvement of animals and farmers in farming practice, in addition to research under controlled experimental conditions in which, for reasons of objectivity, the role of subjective, embodied experiences of stockpersons are backgrounded. In this article we have shown that sociology can make a valuable contribution to such research by offering insights into how more or less positive sow–farmer relations are (re)produced in materially situated farming practices. Yet our social scientific inquiry necessarily entailed different limitations – including, markedly, its inference of sow welfare experiences from farmers' observations. These welfare assessments by farmers can be criticised for being anthropocentric and anthropomorphic, and thus for denying the independent actions and intentions of animals that animal scientists may uncover (Broom 2011; Karlsson 2012). Importantly, such criticism points to the need to develop an interdisciplinary research agenda in which animal scientists and social scientists (among other scholars such as philosophers and economists) jointly explore on-farm dynamics of animal–human interaction (Leeb 2011). At the same time, our study showed that we should be careful not simply to dismiss farmers' understandings of the welfare needs of their animals as being biased. Farmers may not only represent a valuable source of contextualised knowledge of farm animal behaviour. Since their empathic and anthropomorphic understandings of their sows enhanced the farmers' readiness to promote sow welfare, it is also vital to gain more insight into the factors that constitute farmers' relations with their animals and to search for ways to stimulate the embedding of positive animal–stockperson interaction in everyday farming practice (Buller and Morris 2003; Bock *et al.* 2007).

At a policy level, our analysis revealed that governing change in farming practices is an emergent process rather than a linear causal social dynamic (Shove *et al.* 2012). This understanding invites restraint in imposing policy measures that require

long-term investments by farmers which may materially lock in negative animal–farmer relations. In practical terms, this warrants a questioning of a single deadline by which farmers must implement infrastructural changes on their farms. As we have seen, such a deadline may force farmers who lack the willingness or economic resources to invest adequately in animal-friendly and farmer-friendly conditions to introduce measures that harm rather than improve animal–stockperson relations. To avoid such undesirable on-farm effects, a single deadline could arguably be replaced by a phased strategy, for instance, one requiring that measures are introduced in each newly built barn, or one that provides government or market-based economic incentives to encourage the voluntary implementation of animal welfare measures.

Furthermore, our process-based understanding of governance invites iterative mutual adjustments of policy measures and of the configurations of practices that they aim to steer rather than a single one-size-fits-all intervention. Given the restricted impact of farmers' attitudes on their embodied and contextualised behaviour, the recurrent provision of information to farmers will be unlikely to reconfigure sow–farmer relations in desired directions. It seems more productive to design policy interventions that persuade scientists, policy-makers and farmers to recursively monitor and improve the on-farm infrastructural and management conditions in which farmers and their animals interact – and in which more or less positive animal–farmer relations and welfare experiences are (re)produced.

Reflection

Having discussed how the EU group sow housing legislation affects everyday sow–stockperson relations, and how future farm animal welfare science and policy may learn from our practice-oriented understanding of these on-farm effects, a final reflection concerns our utilisation of practice theory in this article. Notably, this body of theory has been developed and, to date, predominantly applied to gain insight into the dynamics of human (inter)actions (see, for instance, Schatzki 2002, p. 71; Shove *et al.* 2012, pp. 125–126). In this article we have shown that the scope of practice theory can be usefully extended to facilitate an analysis of how animals actively co-constitute farming practices in interplay with stockpersons and material settings. In doing so, the article has opened up a new, comprehensive approach to examine on-farm animal–human relations. At the same time, our explorative – and hence necessarily introductory – investigation of how a practice approach may factor in animals' sentience and inter-species relationships with humans, warrants further conceptual refinements of practice theory. In particular, such refinements should contribute to correcting practice theory's initial, overly anthropocentric definition of the practitioners who enact and reproduce practices, to allow for an improved understanding of the distribution of agency across human and non-human animals in the constitution of agricultural and potentially, also, wider everyday social life.

Notes

- ¹ We were able to interview only two women pig farmers (F2, and F3 with her husband). This represents a bias in our sample, as gender co-determines stockperson attitudes (Spoolder and

Waiblinger 2009) and different male interviewees indicated that they manage the farm with their wives.

- ² These systems involved interiors with floor feeding systems, drop or trickle feeding, *ad libitum* feeding, electronic feeding stations and feeding troughs. For detailed information of these systems, see SVC (1997) and Tuytens *et al.* (2008).
- ³ All quotes from the interviewees are the authors' translations.
- ⁴ None of the interviewees indicated that they lock up all their sows permanently. In theory, however, it is possible to do so and this may be an additional reason why farmers preferred free-access stalls over alternative systems.
- ⁵ Some interviewees were used to housing gilts in groups, partly to stimulate their leg and pelvis muscles and thereby facilitate a gilt's first farrowing.
- ⁶ The group sow legislation may also entail selection effects among farmers, for instance, by motivating farmers to quit sow farming because they experience little working pleasure in it, or because they face difficulties in achieving good technical and economic results with group-housed sows. Whether and to what extent this will happen is difficult to forecast on the basis of our data and the question provides an interesting topic for further research.

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Michiel P. M. M. de Krom*

Department of Sociology

Ghent University

Korte Meer 5

9000 Ghent

Belgium

and

Social Sciences Unit

Institute for Agricultural and Fisheries Research (ILVO)

Burg. Van Gansberghelaan 115, box 2

9820 Merelbeke

Belgium

e-mail: michiel.dekrom@ugent.be