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Protecting farm animal welfare during intensification: Farmer perceptions of economic and regulatory pressures

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Abstract

*Pig (*Sus scrofa*) production in Hungary provides a case study in how external pressures influence animal production, animal welfare and intensification. External pressures were explored in 24 in-depth, semi-structured interviews with Hungarian pig farmers operating either confinement or alternative systems. Confinement producers reported intense economic pressure because of a power imbalance with the large meat-processing companies that buy their animals. These companies, in the view of the farmers, can source internationally and largely dictate prices. When prices paid by the companies fall below the cost of production, farmers cannot respond by reducing production because of the long time-lags between breeding and marketing; and with their large investment in confinement buildings that are difficult to modify, farmers see little option except to reduce production costs further. Alternative farmers reported being more resilient to economic pressures because they sell into niche markets, use inexpensive technologies, and typically produce a diversity of agricultural products which buffer periods of low profit in any one commodity. The current regulatory system was seen as inadequate to protect animal welfare from economic pressure because it focuses on certain inputs rather than welfare outcomes, does not cover some important determinants of animal welfare, and does not accommodate certain realities of farming. Current subsidies were also seen as an inadequate remedy, and were viewed as inequitable because they are difficult for alternative producers to access. Consumer-choice options, while used by alternative producers, are not available in mainstream markets which demand uniform 'commodity' production. The economic constraints that influence animal welfare might be better mitigated by a regulatory system developed with greater consultation with producers, a more equitable subsidy programme, and more developed consumer-choice programmes.*

Keywords: *animal welfare, economics, intensification, pigs, regulation, subsidies*

Introduction

Since Harrison (1964) first drew attention to the animal welfare problems of confinement animal agriculture, a great deal of change has occurred (Miele *et al* 2005; Blokhuis *et al* 2010). Welfare problems have been identified and debated, scientific methods have been developed and refined (Broom 1991; Webster 2005), and animal advocacy has been widely engaged in creating public awareness and influencing legislation. However, significant debates over farm animal welfare continue, and these have led to competing discourses (Stibbe 2005) and ethical frameworks (Fraser 2008) to understand the problem and propose solutions.

There is wide agreement that complex, interconnected factors affect farm animal welfare (Fraser 2008, 2014; Anderson 2011), but research on these factors has been limited. Studies to date have focused predominantly on understanding the conflicting norms of farmers and the non-producing public (Miele & Bock 2007), the inconsistencies between societal principles and consumer purchasing behaviour (European Commission 2016), and possible drivers of change through willingness-to-pay studies (Glass *et al* 2005).

However, in deciding on their animal management practices, farmers are highly constrained by external factors (Thompson 2001; Hendrickson & James 2005) that have received too little attention in animal welfare research. One is legislation which on the surface requires certain practices to be followed, although the actual effects of legislation on animal welfare have been little studied. Second are the economic constraints created by the marketplace, especially as there is often a power imbalance when many farmers must compete to sell products to a small number of processing companies. Third are subsidy programmes which are designed to compensate for the higher costs of good welfare practices but may have more complex effects.

The present study was designed to understand the perceptions of animal producers of these external pressures and how they influence farming operations and animal welfare.

Materials and methods

A grounded theory approach (Glaser & Straus 1967) was used because it offers a suitable approach for exploration and a systematic method of data collection and analysis (Charmaz 2006).

Study area

To create an in-depth study of a context-specific case, we selected pig farmers who use confinement or alternative production methods in Hungary. Hungary, although chosen for convenience, provided a valuable study area. First, while most previous research involving farmers as participants has occurred in Western Europe and the English-speaking countries where the shift to confinement production is far advanced, Hungary still has a mix of confinement and alternative systems, thus providing an opportunity to compare the pressures at a time when a move to high-efficiency confinement methods is still in progress. Second, qualitative studies in Eastern Europe are under-represented in the scientific literature and Hungary provides an example where, as an EU Member State, animal welfare must be addressed after a turbulent history has imposed multiple transitions on farming.

Pig (*Sus scrofa*) farming is a traditional activity in Hungary. In the early 1980s pig production peaked at over ten million animals per annum, gradually decreasing to a low of about four million by 2013 before beginning a slow increase (FAO 2018). During roughly this period, the number of commercial pig farms decreased from 501 holdings in 2001 to 312 in 2013, while the average herd size increased from 7,500 pigs per holding in 2005 to 8,300 pigs per holding in 2013 (EUROSTAT 2019). The proportions of alternative versus confinement methods have also shifted. Until the 1950s the Hungarian *mangalica*, a slow-growing, traditional breed, was widely kept, predominantly in alternative systems, until modern 'white' strains, bred for production efficiency, took over. While in 1955 there were 18,000 purebred *mangalica* sows in Hungary, by 1970 the number of registered individuals had decreased to 35–40 (Mangalicatenyésztők Országos Egyesülete 2017). The *mangalica* pig was then revived as a commercial breed in the mid-1990s, with 8,600 registered sows in production in 2008 (Mangalicatenyésztők Országos Egyesülete 2017), predominantly in non-confinement systems.

Confinement technologies have also spread widely in the country. In 2018, the number of white sows kept in these systems amounted to 180,000 individuals (Központi Statisztikai Hivatal 2018).

The economic context of pig production in the EU between 2007 and 2016 is also noteworthy. The price of pork shows annual cycles with higher (above production cost) and lower (around or below production cost) phases of profitability (European Commission 2019a,b). Between 2000 and 2007, the average price of pork in the EU was €1.28 per kg. This increased between 2008 and 2014 to €1.42 per kg which (in 2015) was €0.15–0.5 higher than in other major pork-producing countries such as the US and Brazil (Vernooij 2015). During this period (2007 to 2014) consumption of pork in the EU dropped by 6.2% mainly because increased feed costs led to higher pork prices and consumers changed to cheaper sources of protein during the economic crisis (Vernooij 2015). These factors increased over-capacity and competition in the sector, creating more pressure toward large, intensive operations that could achieve economy of scale and market access (Vernooij 2015) and placing further pressure on small- to medium-scale confinement pig producers.

Recruitment and participants

The research used a purposive sample of participants who were residents of Hungary and kept 50 or more breeding sows for commercial purposes. Participants included farmers using 'confinement methods' in which domestic pigs of modern 'white' breeds were kept in indoor housing, predominantly with mechanical ventilation and feed provided in troughs or dispensers, and those using 'alternative methods' in which white pigs, *mangalica* or wild boar were housed predominantly outdoors with manual labour for tasks such as feeding and cleaning. Participants meeting these criteria were also expected to operate farms that conformed to existing agricultural and welfare-related legislation, especially to ensure that their views were representative of mainstream farming communities.

Of the 24 participants interviewed, 22 were male and two female. Twenty-one described themselves as originating from rural environments, while three were originally from urban environments and later moved to the countryside to farm. Almost all participants had a high exposure to farming from an early age. Twenty-two came from farming families, while two originated from families with close contact to rural life. Twenty-two possessed a higher (mostly veterinary or agricultural) degree while the remaining two possessed secondary education also in agronomy or livestock breeding. Of the 24 farmers, half used confinement and half used alternative production methods.

Participants were recruited using a snowball sampling method (Taylor-Powell 1998) and were invited to take part in the research voluntarily. To ensure methodological consistency, only the first participant was known to the researcher, while all the others were identified by those who had already been interviewed. Sample size was determined by data saturation as defined by Guest *et al* (2006). Data validity was ensured by a number of reflective exercises including data triangulation and the critical assessment of negative evidence and/or rival explanations (Jick 1979; Creswell 2003; Yin 2009, 2016; Miles *et al* 2014).

The interviews

Interviews were conducted between 1 September 2015 and 30 June 2016 and were based on a protocol adapted from a format proposed by Arskey and Knight (1999). The protocol was pilot-tested on two occasions with an experienced qualitative researcher who was knowledgeable of pig farming. This allowed the researcher to pre-assess interview techniques, refine the interview questions and reflect on the use

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of prompts. After launching the project, the interview protocol remained stable. Questions were designed to guide semi-structured interviews in a flexible manner, allowing the researcher to follow the logic of the participant. After the fifth and tenth interview, a detailed review of the research process and progress was carried out based on a post-interview reflective exercise adopted from Arksey and Knight (1999).

The length of the interviews, which was not pre-determined, ranged from 50 to 95 min until the desired level of clarity was achieved. Since many participants were initially sceptical of a researcher interested in animal welfare, the interviewer tried to create a relaxed, non-threatening atmosphere for participants in order to gain rich narrative data.

Opening questions aimed to explore the life history of the participants, including how they decided to pursue farming as an occupation. These discussions were followed by more targeted questions aiming to understand: (i) how the pig farming sector functions; (ii) what kind of challenges the farmer encounters; and (iii) why these should be addressed. During the interviews farmers gave detailed accounts of external pressures they identified, and how these affected the sector, their farming enterprise and the welfare of their animals. Almost all farmers gave detailed, concrete examples to illustrate their claims, and frequently reflected on current problem-solving methods, critically assessing their outcome.

With the consent of participants, interviews were recorded with an Olympus VN-731PC digital voice recorder (Olympus, Tokyo, Japan) and were later transcribed *verbatim*. Individual transcriptions were uploaded for analysis into the qualitative data analysis software Atlas.ti (version 7.5.16).

Primary data consisted of the 24 in-depth semi-structured interviews. Secondary data included detailed objective/reflective notes and research memos that were produced during the course of data collection, transcribing, coding and analysis.

Data analysis

A Grounded Theory approach (Glaser & Strauss 1967) was used in data analysis to allow findings to 'emerge' from the data. In line with Grounded Theory, transcribed interviews were coded in several rounds. Initial coding involved a random sample of six interviews (three confinement and three alternative); these were coded by an 'open coding' strategy (Strauss & Corbin 1990) which yielded a detailed list of emerging themes in the form of initial codes. The initial codes were then re-examined and revised into 'themes' and 'codes'. In the second round of 'focused coding' (Strauss & Corbin 1990) interviews were coded (or re-coded) based on the revised set of themes (n = 9) and codes (n = 82), and numerous analytic memos were added to the transcripts.

Data analysis also involved an iterative process. First, the coded data and analytic memos were freely explored to identify grounded findings and differentiate these from speculations (Charmaz 2006). The analytic memos were used to compare coded data segments with other data segments, codes, and themes. Next, a comparative analysis of disassembled parts of the data allowed the final conceptual categories or themes to be identified (Charmaz 2006).

Data analysis continued until theoretical saturation (Charmaz 2006), the state when no new properties emerged. Representative data segments (interview quotes), with participants identified by fictious names to preserve anonymity, were chosen to illustrate findings. Finally, in line with a Grounded Theory approach, the interpretation of results was critically re-examined to enable "the most plausible explanation" (Charmaz 2006; p 104) of findings.

The research followed the Central European University Ethical Research Policy rules and was approved by the Prospectus Defence Examination Committee.

Results

Market and economic pressures

Farmers perceived that customers do not attach high value to food — that they pay low prices for food versus other purchases, and that most shop for price rather than quality. One participant used the example of consumers seeking *kolbász* (a salami-type meat]) for 1,000 HUF (3€ per kg):

> Everyone wants 1,000-HUF *kolbász* and extensive pigs…which in reality costs 10,000 HUF… But they want a 40 million HUF Land Rover… and 50–100,000-HUF shoes, because they look good. But they'll only pay 1,000 HUF on food… So, in large-scale retailers all you can see on the shelves is garbage, not food. Alternative Farmer Kevin.

As in this example, the perceived under-valuation of food was often contrasted with the high prices paid for other goods (eg cars, clothes or mobile phones) and services (eg the purchase of ready-made foods). Farmers articulated that the preference of customers affected many attributes of animal-derived products, including both price and quality.

This inclination of consumers was considered to influence the actions of the slaughter and meat industry. Farmers believed that large slaughter plants are concerned only to obtain a standard size of pig for the lowest price — that they support 'commodity' production based on price, rather than 'custom' production based on quality or distinctive features.

> In terms of sale, the [slaughter and meat] industry expects uniformity… they all want the same diameter loin. Confinement Farmer Philip.

Thus, farmers saw uniformity of the product as the main concern of the meat industry rather than more significant product attributes such as nutritional value or freedom from chemical residues. Farmers found that this led to pressures on the mainstream market that would favour large-scale production and sale of lower-quality 'commodity' goods.

Farmers highlighted that prices paid for their products in earlier times covered the cost of production plus some profit. In that case, prices would fluctuate depending on input costs such as the local price and availability of feed, plus time and labour. Now, however, large companies essentially dictate prices; and with many farmers competing to sell to a few plants, the power relationship is very unequal.

> The interests of farmers and slaughterhouses are conflicting…The slaughterhouse will always opt to buy pigs as cheap and in as crude form as possible. Confinement Farmer Mark.

Thus, farmers found that in the mainstream market they were unable to negotiate the price of their products. Moreover, some producers sell by contract for a known price, but the agreed price will favour the processor, and there may also be uncertainty over being paid at all. Others sell without a contract in which case the price is determined by the market. In either case, the price received may not even cover production cost at certain times.

> In 2007…[finished] pigs…were purchased around 285 HUF per kg [0.88€ per kg]… There was a serious drought, which raised input costs, so we finished the year with a 50 million HUF [153,903€] loss… That year many farms were unable to stay in the market. Confinement Farmer Alex.

Farmers therefore emphasised that they need to plan ahead by saving during times of profit to prepare for times of loss. Indeed, some participants claimed that producers are able to stay in business only if they can break even in every fiscal year.

But while it would appear rational to scale back production to match periods of low income and/or low demand, participants emphasised that in livestock farming this is not a realistic choice, because time lags in production are about six months or more.

> Even if I decide to stop pig farming, I will still have to operate at least for another six months as if nothing happened… I cannot slaughter a pregnant sow… In this amount of time, the market may even take a turn. Confinement Farmer Richard.

Thus, participants claimed that their only option is to keep producing as efficiently as they can. Indeed, they emphasised efficiency as a key issue in livestock farming. Moreover, with free trade, slaughter and meat companies can source animals from outside the country. Therefore, if feed costs are high for local producers, companies do not need to increase the price they pay for pigs because they can import from elsewhere.

> [The consequences of] globalisation are unbelievable… If there is drought here, but amazing production in Argentina and Canada, they bring two shiploads of products into Hamburg… Then we [local farmers] can all starve. Alternative Farmer Kevin.

This economic pressure makes livestock farmers vulnerable and can lead to short-term thinking and induce production externalities along the whole value chain. For example, farmers using confinement methods emphasised that they use commercial fertilisers rather than manure for their crops simply to avoid the high cost of spreading manure.

> We wanted to use manure on our lands… [but] it required a huge effort… We could accomplish about 20 hectares a day, while 80–100 hectares can be done with spreading [artificial fertilisers]… We know that in the long term artificial fertilisers will harm the natural environment…but people also need what is here today. Confinement Farmer Richard.

Animal welfare problems were also viewed by participants as unwanted outcomes that farmers aimed to minimise as far as possible. But producers using confinement methods found that measures to ensure good animal welfare were costly.

> The sector is profit-oriented but, since 2008, the market reached record low [prices] and we [the farmers] had to produce below production cost and could not realise any profit… If there is no profit, the farmer is unable to meet animal welfare requirements… Because there is little income, farmers use up all their reserves… We have been without profit for ten months now… It is in the farmers' interest to ensure the best possible conditions for their livestock, because animals produce well when their needs are met… But if there is no money in the sector, then we are unable to ensure [good welfare]. Conventional Farmer George.

Economic pressures therefore did not alter the principles of farmers but had clear effects on their practices.

The economic vulnerability of farmers appeared to depend partially on their production methods. Pig farmers using confinement methods invest significant capital in facilities. Once they have installed costly equipment and housing, they appear to have little option except to use these investments and compete with other farmers in the mainstream market. For farmers using such specialised operations, the only option is to cut production costs further.

> The economics of a farm depend on the building structure, the economic structure, specific production parameters and the market… It is difficult for us to change the building structure and greatly enhance production parameters… and impossible for us to change the market. We are left with the only possibility to fine-tune the economic structure of the farm by decreasing input costs. Confinement Farmer Oliver.

The pressure to reduce input costs — including amenities for animals such as space — was thus perceived by confinement farmers as an inescapable reality of the market.

Alternative farmers have higher variable costs of production, for example, because of the slower growth and lower feed conversion efficiency of traditional breeds. However, alternative farmers avoid some economic pressures by not investing in expensive technologies and by selling directly to those consumers who are willing to pay for what they perceive to be good quality. They also use diversification (mixed farming) to provide resilience in the face of fluctuating prices and costs; when one product fails or prices decline, other products can maintain some income.

> From the start I built a system that was not dependent upon 'one leg'. There came a crisis on the pig market in 2006 and 2007, which would have eliminated us. After that, there was severe drought. If I only had grain, we would have gone bankrupt that year… so we try to balance things out. When we had 20 sows, we were able to farm 30 hectares of land… and every 'leg' had to be of the same scale and grow evenly… So, I must emphasise that balance and diversity are crucial. Alternative Farmer Frank.

With specialised production, as occurs in some confinement operations, this option is not used and those pig farmers face little income or negative income when prices fall below production cost.

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Political and regulatory pressures

Participants appeared to appreciate the importance attached to agriculture as a political issue, linked to concern about national security and food sovereignty.

> All states… all politicians will strive to ensure that agricultural production is ongoing. It is so [valuable] that they continue supporting farming, even when it is not justified economically. Confinement Farmer Harry.

Farmers also highlighted that the EU played an important role in initiating political dialogue on animal welfare and legal measures to ensure good standards. But while valuing many aspects of the EU approach, they were critical of others, and many perceived a conflict between animal welfare and other political priorities — notably to ensure economic growth and prosperity. The resulting compromise was seen as leading to standards that address only very basic aspects of animal welfare.

> Let's face it, the standards are truly minimal. Confinement Farmer Bruce.

While the requirements — which focus mostly on 'inputs' such as the physical environment and certain management actions — were seen to mitigate some negative features, they were not seen as leading to major reforms.

> Standardised legislation only provides a framework… But… it does not take us very far. Approaching animal welfare by giving a list of physical and some vague management-related rules — in my opinion — will not ensure that livestock will be properly cared for. Confinement Farmer Philip [post-interview notes].

Hence, participants found that animal welfare input requirements, although reflecting some aspects of animal welfare that are relevant especially for on-farm assessments or for evaluating development grants, had only limited ability to produce good welfare.

Moreover, participants did not see the priorities of legislation (eg increasing space allowance) as necessarily improving welfare. Instead, they saw other issues, such as the aggression that occurs when new groups of pigs are formed, as important for welfare but ignored in legislation.

> Tell me why the castration of piglets or the use of sow stalls is the most important welfare issue, while there is no legislation to address the problem of group mixing? It is left entirely to farmers when and how often they group their livestock, and if done badly it can cause an incredible amount of suffering, serious injuries and even death. But no one seems to care about that. Confinement Farmer George [post-interview notes].

Some legislation was also seen as counter-productive, for example, in cases when it merely moves production into less regulated jurisdictions.

> 3-4 years ago fur farming was banned in The Netherlands… If you look at it from the perspective of a European farmer, can we say that the ban was successful? There are fewer animals kept in Europe, but the industry has been moved to places where welfare conditions are much worse. Confinement Farmer Harry.

Farmers using confinement methods in particular highlighted that 'radical' legislative approaches (eg bans) in most cases were unable to improve animal welfare. Participants emphasised that social consensus on production standards is needed. Some expressed the view that this would facilitate the development of 'realistic' legislative standards and the use of 'widely acceptable' methods.

Participants also noted that when they visited pig farms in other EU countries, they found inspection, enforcement and compliance to be variable.

> A couple of years ago…we visited a 600-sow farm in Italy. Now, Italy is also a member of the EU, so the Italian farmers need to observe the same legislation as we do… and by law, 30 days after insemination, sows should be kept in group housing. On this 600-sow farm… none of the sows were kept in group housing… I also found that only few places fully observe space requirements… I went to a pedigree farm in Sweden where the animals could barely lie down… So, many animal welfare legislative standards are not observed. Confinement Farmer George.

Some farmers argued that livestock farming is unpredictable and that unusual events may make compliance impossible. For example, if sows give birth to more piglets than usual, the animals may need to be overcrowded for a time.

Farmers also noted that enforcement commonly focuses on the physical surroundings rather than welfare outcomes.

> [Ministry officials] came and checked the premises… and found 1.5 cm difference between the legislative standard and our fence, and ordered us to take it down immediately… [But the fence] did not make a difference to welfare… We think that people who come up with such rules just sit behind their desks and have no idea what they are really doing. Alternative Farmer Angela.

Participants also found that the inspection and enforcement system did not end serious abuses.

> I think that people [who mistreat animals] should go to prison and be banned from keeping animals… But even this almost never happens… The system does not work because authorities are too forgiving. Confinement Farmer Henry.

In fact, many participants appeared to believe that it is in their interest to have more consistent implementation of animal welfare legislation in order to ensure less competition from substandard producers and a higher societal appreciation of the efforts of 'good' farmers.

Welfare subsidies

The Common Agricultural Policy (known as CAP) is an EU-wide subsidy scheme primarily supporting farm productivity, food supply, farmers' income and the rural economy and is widely acknowledged by farmers as supporting farming and relieving some of their economic constraints. They also see CAP payments as compensating for some animal welfare improvements.

> Animal welfare payments are granted when farmers voluntarily exceed basic legislative requirements. This costs money for the farmer. If I give more space for my fattening stock, I spend at least 100 HUF more on each pig… If I get 120–130 HUF… then everyone benefits. The state supports the farmer, the farmer has a bit of extra money, and the… animals are better cared for. Confinement Farmer Peter.

Thus, farmers perceived animal welfare payments as creating a 'win-win' arrangement, which was especially appreciated by producers using confinement methods.

However, participants found that the ability for CAP payments to compensate farmers for higher welfare conditions was only ensured when farmers were able to at least break even. In times when prices were below the cost of production, farmers claimed that CAP payments only enabled them to remain in production.

> In the current harsh market conditions, it is possible to break even with the sow welfare payments… That's all. Confinement Farmer Richard.

In addition to this challenge, participants also claimed that the CAP system is a 'one size fits all' approach that does not accommodate alternative production.

> When we submitted our application… we had to report the size of the barn… and the size of sow enclosures. When we told them there were no square meters to report because our animals were free, they said that we could not get the money… even though our livestock have much higher standards… So, I don't think [CAP] payments should keep the industry going, but rather farmers should be properly paid for their products. Alternative Farmer James.

Thus, due to the granting system, alternative farmers, who provide less restrictive environments, were often unable to receive animal welfare payments despite higher input costs for factors such as feed. As one alternative farmer expressed:

> We could hardly get sow welfare payments… Our application reached the highest possible forum, and they said to us: 'Why should we give the *mangalica* farm any money? Their pigs have such a good place anyway. They are outdoors all day and sleep under the trees, and we know the farmer will not invest the money…' We finally managed to resolve this issue, but we needed to find a loophole in the legislation… This is what our lives are about: we try to find loopholes. Alternative Farmer Frank.

Hence, with the lack of distinction between alternative and confinement production, animal welfare payments did not support high welfare as conceived by the alternative farmers.

Discussion

Participants in this study — especially those using confinement methods — clearly felt that severe economic constraints are a major driver of how they raise pigs.

As previously noted in the US, the consolidation of slaughter and processing facilities can leave large numbers of farmers selling to a small number of processors (Hendrickson & James 2005), and these trends have also been noted in the EU (Vernooij 2015). With this imbalance of economic power, income for farmers can become greatly reduced, and often falls below the cost of production for significant periods (Fraser 2005, 2008).

Participants in our study noted that unique features of farm animal production prevent them from adapting to these challenges through the usual logic of matching supply to demand. In particular, they noted that farmers cannot readily reduce production in response to lower demand (and hence price) because of the long time-lags in animal production — for example, because a reduction in breeding will not reduce the supply of market-age pigs until many months later. Thus, at times of low prices, farmers may be forced to continue selling at a loss for months, and many have been forced out of production, as has occurred in other industrialised countries (Fraser 2005, 2008; Marquer *et al* 2014).

The common industrial trend toward automation and specialisation has not solved the problem for small- to medium-scale Hungarian pig production. Specifically, farmers who specialise in pigs or any other single product give up the economic resilience enjoyed by mixed farmers whose diversified production allows them to survive periods when profits from any one product are severely reduced. Because the price of finished pigs goes in cycles (European Commission 2019a,b) small- to medium-scale confinement farmers may endure regular periods of loss that require them to economise on production cost. In addition, early technological choices tend to be self-reinforcing: once confinement producers have invested heavily in automation and facilities, they see little option except to continue using this large, fixed investment. Farmers found that this technological lock-in (Cowan & Gunby 1996; Foray 1997; Perkins 2003) prevents them from taking proactive measures to address economic challenges and animal welfare problems. Participants also believed that their challenges are exacerbated by 'globalisation' because processing companies can source products from other countries rather than paying higher prices to local producers during temporary increases in costs such as feed. Thus, participants appeared to agree with Vernooij (2015) that the current market provides a competitive advantage to large-scale, fully intensified operations.

Under these complex economic pressures, farmers using confinement systems see little option except to reduce the cost of production further, for example, by minimising space, reducing spending on animal care staff or by avoiding high labour costs. Social scientists exploring issues of farm animal welfare have often focused on the values of producers (Serpell 1999; Te Velde *et al* 2002; Lassen *et al* 2006; Bock & van Huik 2007; Miele & Bock 2007; Vanhonacker *et al* 2008; Spooner *et al* 2014). However, consistent with the findings of Hendrickson and James (2005) in the USA and Thompson (2001) our findings suggest that economic constraints can make it very difficult for producers to put positive animal-care values into practice.

In Europe, the standard solutions to concern over farm animal welfare have been: (i) to regulate production methods so that they do not fall below an acceptable standard; (ii) to subsidise farmers for using more costly methods that are believed to improve animal welfare; and (iii) to provide information to consumers so that they can exercise choice and support animal welfare standards that they endorse. The participants of this study identified limitations to all three of these approaches.

A regulatory approach was seen as flawed for many reasons: (i) because it tends to focus on certain inputs such as space

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allowance which do not necessarily ensure good welfare outcomes; (ii) because some important determinants of animal welfare are not covered; (iii) because enforcement is seen as inconsistent; (iv) because unpredictable events, such as an unusually high birth rate, can make compliance impossible at certain times; and (v) because it does not prevent serious animal welfare problems caused by very poor producers. That said, participants did not seem to resent regulations *per se*, and some wanted to see serious welfare problems rectified. Hence, there appeared to be support for a regulatory approach, but it would need to be developed with more consultation with producers so as to make a better fit to animal welfare outcomes and to the practical realities that farmers experience.

The current system of subsidies was also seen as limited. First, participants noted that at times of very low prices the subsidies do little more than prevent losses. Moreover, subsidies were seen as unfair because the criteria, while rewarding farmers for providing more space in confinement units, give no reward for the much more spacious environments in alternative systems unless producers use 'loopholes' to qualify. Indeed, for a sector like Hungarian pig farming that is undergoing intensification, the subsidies could be seen as incentivising the move to confinement if they apply principally to confinement methods. Thus, while participants expressed some appreciation for subsidies, they clearly felt that changes are needed to make the system more effective and equitable.

The third option — involving informed consumers exercising choice — was obviously used by alternative producers selling into niche markets, but this approach appeared to have little scope for the mainstream market. Participants using confinement methods reported that companies want only uniform 'commodity' production, leaving little or no scope to differentiate products from farms that follow high welfare standards. To apply a consumer-choice model of reform in Hungary would appear to require major expansion of existing niche markets or the development of organised labelling programmes such as exist in some other countries.

The economic pressure reported by confinement producers, combined with industry statistics, suggest that confinement production in Hungary is undergoing the consolidation of ownership seen elsewhere (Fraser 2005, 2008) whereby some producers expand their operations to achieve economies of scale and better access to markets, while many cease production. However, the resilience expressed by some alternative producers, coupled with the large growth in the number of *mangalica* sows, suggest that low-capital alternative production systems selling into niche markets are also a viable alternative for a minority of production.

Policy-makers and regulators need to recognise that these two segments of production require different interventions to protect animal welfare. A regulatory approach may help protect animal welfare in confinement systems although regulations would need to be more uniformly applied and better targeted to the welfare concerns of producers themselves. This might be achieved by greater involvement of producers in setting standards and possibly ensuring compliance, as occurs with other professions (Fraser 2014). For alternative producers who operate outdoor systems, the regulations that apply to confinement production may be irrelevant or counterproductive. Here, the challenges to animal welfare may include difficulty in securing and retaining the high level of labour that such systems require and maintaining the necessary amount of land in the face of growing demands for land for other purposes. Meeting such needs might be a more productive use for subsidies. Thus, in line with Anderson (2011), Gruen (2011), Falk and Szech (2013a,b), and Sandel (2013), our evidence suggests that more targeted, strategic and complex reform efforts, involving legislative and market-based mechanisms, are needed to ensure animal welfare.

Animal welfare implications

Participants in our study, especially those using confinement production methods, noted that economic constraints caused by low profits severely limit their freedom of action and can jeopardise animal welfare. To better safeguard animal welfare: (i) the regulatory system would need to be revised with greater consultation with producers and more uniform implementation; (ii) the subsidy system would need to be broadened so that it better supports alternative systems; and (iii) for an effective consumer-choice option, Hungary would require greater recognition of existing niche markets and/or an organised and widely available labelling programme.

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