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My pigs are ok, why change? – animal welfare accounts of pig farmers

R. Albernaz-Gonçalves [a,b], G. Olmos [c], M.J. Hötzel [a,*]

[a] Laboratório de Etologia Aplicada e Bem-Estar Animal, Departamento de Zootecnia e Desenvolvimento Rural, Universidade Federal de Santa Catarina, Florianópolis, 88040-900 Florianópolis, SC, Brazil
[b] Instituto Federal Catarinense, Campus Santa Rosa do Sul, 88965-000 Santa Rosa do Sul, SC, Brazil
[c] Veterinary Epidemiology Unit, Department of Clinical Sciences, Swedish University of Agricultural Sciences, Box 7054, 75007 Uppsala, Sweden

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ABSTRACT

Intensive pig production systems are a source of stress, which is linked to reduced animal welfare and increased antimicrobial use. As the gatekeepers of the welfare of the animals under their care, farmers are seen as the stakeholder responsible for improving animal welfare. The aim of this study was to explore the knowledge and attitudes of pig farmers towards pig welfare and the impact of such attitudes on farmers' selection of management strategies on the farm. We conducted in-depth semi-structured interviews with 44 pig farmers in one of the main pig producing regions of Brazil. Interviews covered knowledge and attitudes towards pig sentience and behaviour and welfare-related issues commonly observed in intensive pig farms (belly-nosing, fights, tail-biting, diarrhoea and castration without pain control) and farmers' conception and attitudes towards pig welfare. We identified many management and animal-based indicators of poor welfare, such as the use of painful and stressful management practices and use of environments that limit the expression of natural behaviours. However, most farmers were satisfied with animal welfare standards at their farms. Farmers' perceptions are aligned with their understanding of animal welfare. Although they identified all the dimensions that impact the welfare of a pig on a farm (affect, biological functioning and naturalness), their social reality, industry demands and available advice pushed them to perceive their range of action limited to biological and environmental aspects of the animals that do not necessarily benefit affective state. This precluded farmers from making associations between good health and the animal's ability to express a full behavioural repertoire, as well as from viewing abnormal behaviours as problems. The negative consequences for the welfare of the animals were commonly alleviated by routines that relied on constant use of medication, including high dependence on antibiotics. Expressions of estrangement from the production chain were common voices among the participants. This suggests that farmers may not be sufficiently informed or engaged in responding to consumers' expectations and commitments made by companies, which can pose a severe economic risk for farmers. The findings of this study indicate that economic, technical and social factors restrict farmers' autonomy and their ability to perform their role as stewards of animal welfare. (Re)connecting different human, animal and environmental interests may be a step to changing this scenario.

Implications

Detailed accounts of intensive pig farmers revealed a dissonance between attitudes towards pigs' sentience, conceptions of farm animal welfare and on-farm management practices. Social context, industry demands and available advice seemed to push farmers to perceive their range of action as limited to improving biological and environmental determinants of basic welfare, whilst improving mental state was beyond their ability. Moreover, we found evidence of disconnection with industry and consumers' demands/expectations regarding farm animal welfare. Our findings suggest that farmers have an undermined self-determination and autonomy to be critical of their practice and change it, preventing them from successfully caring for the welfare of their animals.

Introduction

Intensive pig production systems are a source of stress and reduced animal welfare. In these systems, pigs are often housed in small or barren environments that prevent them from exhibiting their natural behaviours. This, in turn, increases the frequency of abnormal and stereotypic behaviours, indicating stress (Cronin, 1985). Other common stressors of intensive farming are chronic hunger, painful mutilations, early weaning, high stocking density and successive social regrouping (Pedersen, 2018; Read et al., 2020). Ultimately, the pigs' immune

* Corresponding author.
E-mail address: maria.j.hotzel@ufsc.br (M.J. Hötzel).

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system is compromised, making it susceptible to infections (Filipe et al., 2020). In an attempt to ensure herd productivity and prevent outbreaks of infection, intensive pig farms rely upon antimicrobials and thus maintain the herd health until slaughter (Sjölund et al., 2016). Such use of antimicrobials in food-producing animals is a significant contributor to the to the global issue of antimicrobial resistance and this problem has led to increased regulation of antimicrobial use in the veterinary sector (Van Boeckel et al., 2015 and 2019). Policies that aim to control the spread of antimicrobial resistance call for monitoring/reducing antibiotic use and fostering good husbandry practices, including improving animal welfare (Magnusson et al., 2019). This adds to growing public pressure for food-producing animal sectors to act more coherently with sustainability and animal welfare goals (Pedersen, 2018).

However, despite growing scientific understanding of animal welfare problems and solutions, which supports some local and international regulatory measures, many contentious practices are still the norm in farms throughout the world (Pedersen, 2018; von Keyserlingk & Hötzel, 2015). Farmers are primarily affected, both economically and socially, by the challenges the animal industries are facing. As the gatekeepers of the welfare of the animals under their care (Meijboom, 2018), they are seen as the stakeholder responsible for implementing changes to benefit welfare. However, developing new practices that improve animal welfare is not enough to change the status quo, as innovations often fail to address the farmers' perceived constraints (Weary et al., 2016), especially those of an economic nature (Spooner et al., 2014; Schukat et al., 2019; Molnár and Fraser, 2020). Listening to these key stakeholders is thus essential to help formulate and enact sustainable policies aimed at improving animal health and animal welfare. This information is especially lacking for some top producing countries like China, USA and Brazil, as the vast majority of contributions to the literature on this issue are from European countries (e.g., Kauppinen et al., 2012; Tuyttens et al., 2012; Bergstra et al., 2015; Molnár and Fraser, 2020). This study aimed to explore the knowledge and attitudes of intensive pig farmers towards pig welfare in one of the main pig-producing regions in Brazil and the impact of such attitudes on farmers' selection of management strategies on the farm and their intentions to change.

Material and methods

This work is part of the research project "Knowledge and attitudes of Santa Catarina's pig industry on antibiotics, bacterial resistance and animal welfare" conducted by the Applied Ethology Laboratory of the Federal University of Santa Catarina – LETA-UFSC. This particular study followed a qualitative approach to obtain a detailed account of animal welfare views of pig farmers, acquired through in-depth semi-structured interviews.

Study location

Brazil is the world's fourth largest pig producer, following China, the European Union and the United States of America (FAO, 2020). Santa Catarina (**SC**) state holds the largest production in Brazil (25% of the sows) and is a main livestock export hub, given its special sanitary status and quality of production (SEBRAE and ABCS, 2016). Tubarão is the second-largest pork producer region in Santa Catarina, with 19 municipalities and around 1 500 registered pig production units housing a total of 100 000 sows (CIDASC, 2018, personal communication). Braço do Norte (located between 28° 16′ 30″ S and 49° 09′ 56″ W), a municipality of the micro-region Tubarão, was chosen as the study location because it presents a diversity of conditions found in pig intensive production systems, including labour type, herd size, production types and production models. Pig farming in Braço do Norte focuses on the production of weaned piglets for fattening, but also has full-cycle farms that sell finished pigs for slaughter in small-scale local slaughterhouses. Pig production in the southern region of Brazil is also characterised by specialised production segregated in multiple sites and a smaller number of full-cycle sites. In the study region, the majority of the farms (69.5%) are considered medium-sized (between 300 and 1 000 housed pigs) and the predominant production models include integrated pig producers (45%), cooperatives (39%) and independent producers (16%) (SEBRAE and ABCS, 2016).

Participant recruitment

The recruitment of participants was done through a network of contacts from the first author. The first 12 participants were recruited directly and the other farmers were identified via a non-probabilistic snowball sampling method. This method is suitable for accessing information from groups that are difficult to reach (Roller and Lavrakas, 2015), in this case pig farmers of SC state. Difficulties to contact farmers included internet access, distance from urban areas, and an outdated association list. Initial contact with potential participating farmers was done mainly over the phone, but in some instances, a farm visit was necessary to extend the invitation. Once the farmer agreed to participate, a visit to the farm for the interview process was scheduled.

In total we interviewed 63 pig farmers, of which 44 interviews were considered complete regarding the aims of the present study, of exploring knowledge and attitudes of intensive pig farmers towards pig welfare. All pig farmers ($n = 63$) were willing to participate; however 19 interviews could not be used after the company withdrew authorisation ($n = 5$), the interview was interrupted by the participants that asked to stop because they were either tired or needed to do some routine activities ($n = 10$); or poor audio quality did not allow transcription ($n = 4$).

All interviews were done face to face, in Brazilian Portuguese, between January and February 2019. Before beginning the interview, the participant was given and read the Free Informed Consent Form, which contained all the information relevant to the interview. Only after the consent form was understood and signed, the audio recording and interview process started. The participant could ask questions, interrupt the interview or even withdraw from the study at any time. The interviews were carried out by the same interviewer in order to ensure consistency of the questions. The average duration was of 37 m per interview (between 15m and 1h12m).

The interviews were conducted in two stages. First we interviewed 40 pig farmers, analysed the responses obtained and returned to the study region to conduct another 23 interviews. After the second analysis, no new elements were identified, thus it was considered that the number of interviews provided good data saturation, i.e., they provided an in-depth, diverse and rich account of the topic, and no new information was obtained with the further addition of participants. Sample size for this type of research depends on the diversity within the population of study and the amount and richness of data collected from each participant (Braun and Clarke, 2006; Braun et al., 2019). Participants represented a variety of production contexts and demographics (Tables 1 and 2) and provided a rich data sample.

Interview script

The interview script contained semi-structured and open-ended questions (Supplementary Tables S1 and S2). The interview was divided into four sections: 1) sociodemographic and farm information, 2) discussion of at least two out of five specific health and welfare topics (see description below); 3) attitudes about pigs and pigs' cognitive and emotional capacity and 4) opinion on a hypothetical scenario of animal welfare certification.

The five topics available for discussion were 1) diarrhoea in weaned piglets, 2) belly-nosing, 3) fights, 4) tail biting and 5) piglet castration. Each participant was invited to discuss in more detail at least two topics. One of the two topics discussed was selected based on the type of production of each participant, and the second was randomly chosen to achieve an approximately similar number of responses for each

Table 1
Demographic characterisation of the visited pig farms ($n = 44$) split by productive sector link.

Farm type	Independent	Cooperative	Integrated	Total *n* (%)
Farrow-to-finish	15	0	0	15 (34)
Breeding farms	6	4	8	18 (41)
Growing farms	1	0	1	2 (5)
Fattening farms	6	0	3	9 (20)
Total	28 (63)	4 (9)	12 (27)	44 (100)
Herd size (number/herd)				
≤100 sows or finished pigs	5	0	0	5 (11)
101–500 sows or finished pigs	16	1	4	21 (49)
501–1000 sows or finished pigs	4	1	4	9 (20)
>1000 sows or finished pigs	3	2	4	9 (20)
Other farm activities				
Pig farming only	2	0	3	5 (12)
Dairy cattle	24	3	8	35 (80)
Aquaculture	6	0	1	7 (16)
Beef cattle	1	1	1	3 (7)
Labour type				
Family and hired	11	4	6	21 (47)
Family	15	0	5	20 (46)
Hired	2	0	1	3 (7)
Type of gestation housing ($n = 33$)				
Mixed[1]	11	4	5	20 (61)
Individual	10	0	3	13 (39)
Group	0	0	0	0

[1] Mixed: farms that had individual and group housing.

Table 2
Demographic data of the pig farmer interviews ($n = 44$).

Demographics	*n*	%
Sex		
Male	33	75
Female	11	25
Work experience		
Up to 5 years	3	7
Between 6 and 10 years	5	11
Between 11 and 15 years	6	14
Between 16 and 20 years	10	23
Over 20 years	20	45
Education		
Elementary school	11 (8M, 3F)	25
High school	26 (21M, 5F)	59
Higher education	7 (4M, 3F)	16

theme. The discussion of topics was around participants' personal experience on their farm and farming community. We asked about the frequency of occurrence of problems on farm and in the area, and which of the topics mentioned they considered more important. Within the two topics specifically discussed with each farmer, we asked them to mention what were the likely causes, whether they had considered any mitigation or preventive measures, and if they were feasible options to be used on their farm. The interviewer prompted a list of potential options for each topic in the event the farmer did not provide any personal account during the discussion.

Participants were asked for their opinion regarding the ability of piglets to feel pain during castration and alternatives (immunocastration, castration with pain control and fattening entire males).

All participants answered questions regarding their opinion regarding pigs' ability to express emotions and some attitudes towards pigs. Participants who had breeding farms (full cycle or piglet producing unit, $n = 33$) were asked about abnormal behaviours of sows (dog sitting position and bar biting) and about their attitudes regarding the adoption of group housing for gestating sows. Farmers' responses were recorded using a scale or option grid (Supplementary Table S2), and comments were also followed up in conversation. At the end of the interview, the participant was presented with a hypothetical scenario of certification of farms for a fictitious animal welfare label. This is how it was described to farmers: Let's assume that your farm will be part of an animal welfare certification program in which you will receive additional benefits for producing pigs within certain animal welfare standards. According to your conception of animal welfare, what would your farm need to change to be certified? Lastly, the interviewer asked what was, in the participant's perception, "a pig with a high standard of animal welfare" and what he/she considered necessary to be able to say, "in my farm I care about animal welfare".

Data analysis

We used an inductive (reflexive) thematic analysis approach (see Braun and Clarke, 2006; Braun et al., 2019). This type of analysis is not allied to any specific theoretical framework, thus providing a flexible approach that can be used to examine a variety of issues, going through and beyond researcher insights or expectations. After exhaustive reading of the transcripts for familiarisation with the data, codes were generated and developed into themes. The approach was inductive, where the analytic process starts from the data, working "bottom-up", and thus grounded in the interviewees' responses, minimising biases. Through interactive discussion among the authors, each theme was refined, generating names (titles) and definitions for each theme. Selected extracts that represent the themes were translated by MJH for presentation. Analysis was done with the aid of the NVivo Qualitative Data Management Program (version 11, 2015; QSR International Pty Ltd., Doncaster, VIC, Australia).

Results

Demographic and farm data are shown in Tables 1 and 2. The participating farms had between 50 and 1200 sows or finishing pigs, including full cycle (or farrow-to-finish) farms, piglet producing units (or breeding farms), growers and fattening units. Farmers were either independent, members of one of two integrated companies, or members of one of three different cooperatives. The interviewees considered themselves as experienced pig producers, with 82% of the participants having at least 10 years of experience in the industry.

Farm description/background

Commercial dairy cattle farming was often present in association with pig production (80%); a primary motivation cited by participant farmers for having finishing units was the production of pig manure for fertilising pastures for cattle. All farms had crops, mainly corn, to feed the animals. None of the visited farms used bedding, and all pigs were housed in structures with concrete flooring. Some units linked to integrators were building group gestation housing; however, these farms still maintained individual gestation crates for oestrus detection and artificial insemination. Participants from cooperatives and integrators mentioned that some companies had signed commitments to change the gestation systems, with deadlines for the farmers to adapt until 2026 (Suinocultura Industrial, 2015).

Farmers received technical assistance from veterinarians and agricultural technicians from companies that sold animal nutrition products (45%), from cooperatives and integrators that provided veterinarians or agriculture technicians (36%), or called a veterinarian only for emergencies (19%). Farmers who received regular assistance reported that the frequency was weekly (55%), every two weeks (16%) or monthly (29%).

Farmers' perceptions of sentience and empathy towards the pigs

Farmers perceived pigs as sentient beings, capable of feeling basic emotions, both negative and positive. All participants agreed that pigs are capable of feeling pain ("*The pig is like that, it's not that he doesn't feel pain, it's that he doesn't mind. He is more stubborn than crazy*" – Farmer 59) and most agreed that they could feel fear (91%), stress (95%), joy (86%) and boredom (57%). Farmers agreed that pigs are stubborn (98%), gluttonous (93%; "*They'll eat until they burst if you let them*" – Farmer 50), intelligent (73%; "*Yes, they learn things that make you wonder… They know how to find the water, you can change the place, like the feeder, they will find it. They are very smart*" – Farmer 34), dirty (64%) and friendly (52%).

However, although the farmers recognised pigs as sentient beings, they had negative attitudes towards practices that could improve pigs' welfare or minimise pain. Also, not all farmers recognised the pain caused by their routine practices. For example, only 47% considered castration an extremely painful practice ("*Ah it must hurt, it's done without anaesthesia, of course, it hurts*" – Farmer 16; "*(...) they rub their butts after they are castrated*"- Farmer 55), but 22% said it causes little to no pain ("*No, it's okay to do castration without medication. From one day to the next you look, and it's already dry, he's brand new*" – Farmer 16). Moreover, most farmers rejected alternatives to surgical castration aimed to minimise pain (Table 3). Perceived difficulties of management and increased production costs (69%) was the main reason for rejection of castration with pain control. Some farmers who used immunocastration (27%) were satisfied that they no longer had to do it surgically ("*No more castration. Because they lose a lot of weight, right? It's enough they cut off their tails…*" – Farmer 03).

We observed similar attitudes towards the adoption of practices that could help reduce the frequency of abnormal and stereotyped behaviours, such as offering substrate, rearing in family systems, pre-weaning socialisation and group housing for gestation (Table 3). Participants rejected all alternatives that involved additional production costs or that were laborious ("*It is not possible to raise family lots, because you can't have all the siblings in the same pen.… a sow has 10 to 15 piglets, we won't have a pen for only 10 to 15 piglets from that sow*" – Farmer 34; "*Group housing for gestation is more laborious, costs more and is more difficult to manage. It does not improve productivity and it costs more*" – Farmer 14; "*Offering substrate? It's an idea but I don't know if it would be viable. The cost, and being able to manage it*" – Farmer 15).

All farmers recognised that management practices may lead to pigs' stress ("*If stocking density is too high in a pen they get stressed – lack of food, lack of water. It happens a lot*" – Farmer 34). Also, most (80%) believed that stress may lead to the occurrence of illness *(*"*They can get sick, yes, they get ulcers, a big animal, if it is stressed, it gets ulcers*" – Farmer 50), and especially to thermal stress ("*The temperature fluctuates and their organism suffers, lowers immunity, they are more vulnerable to contracting viruses*" – Farmer 3). Likewise, they believed that good management could reduce the incidence of stress. Yet, the changes farmers proposed were mostly related to basic management aspects of biosecurity and hygiene of the facilities ("*Yes, it is possible with good cleaning, good water, good food*" – Farmer 34; "*Leaving the pens clean, disinfecting, these are ways to use fewer antibiotics*" – Farmer 20).

Table 3
Farmers' attitudes towards pain and alternative pig castration and management methods.

Question	Impracticable *n* (%)	Viable *n* (%)	Do not know *n* (%)
Do you judge the following alternative methods of castration to be viable[1]			
Castration with pain control	20 (77)	0	6 (23)
Imunocastration	5 (19)	9 (35)	12 (46)
Entire pigs	23 (88)	2 (8)	1 (4)
Do you judge the following alternative to be viable[2]			
Offering substrate	41(93)	2 (5)	1 (2)
Familiar group rearing	40 (90)	4 (9)	0
Pre-weaning socialisation	44 (100)	0	0
Group housing gestation	21 (48)	10 (22)	13 (30)

[1] Questions about castration alternatives and abnormal behaviours were randomised ($n = 26$).
[2] All participants answered this question ($n = 44$).

Farmers' conception of pig welfare

We used a word cloud (Fig. 1) to capture the participants' conception of pig welfare. Farmers' mostly explained animal welfare in terms of biological aspects such as health and availability of drinking water and food ("*Pigs with welfare are well cared for, are in a suitable place, with food, with water, they receive the medicines they need*" – Farmer 10) and often referred to environmental aspects such as climate control and cleanliness ("*They need to be in a good environment that is not hot, and that is clean too. That's what welfare is*" – Farmer 23).

Some participants described animal welfare in terms of "a calm or not stressed pig" ("*A pig with good welfare means that he is not stressed, he is lying there, eating well*"– Farmer 3). Although mistreatment was identified as detrimental to the welfare of pigs, some hinted that it is not always possible to avoid it ("*…no mistreatment, not hitting for no reason. But the production practices, those you cannot change. It is stressful, but in the same way as we, human beings, also have stress throughout life, the pigs also have it* (a stressful life). *Welfare is not to hurt them, and being as gentle as possible*" – Farmer 2).

Group housing in gestation sows was used by many farmers as a synonym of animal welfare: "*Animal welfare is because of the sows, isn't it?*" (Farmer 26). Some farmers associated the welfare of pigs with free-range systems and freedom to express the species' specific behaviours, but not as a real possibility ("*I don't know, to be comfortable, they should be free on pasture so they would be very happy*", *Farmer 11;* "*Animal welfare, if you think about it, they should be free* (referring to pigs). *But we try to provide for them, while they are on the farm, we avoid mistreatment, we give them the best, the best condition for them to eat, to not run out of water, to not get sick…*" *(Farmer 15).*

When asked about a hypothetical animal welfare certification scenario, 47% said they already did enough regarding animal welfare (e.g., "*I think our farm provides welfare, nowadays it is possible to adapt everything to the company's animal welfare* (requirements)" – Farmer

Fig. 1. Word cloud with participants' most frequent expressions about the concept of animal welfare in pigs.

43; "*There is no way to change a lot because of animal welfare. Most* (sows) *are already in group housing; we can't do much more differently*" – Farmer 11). Aspects related to the pigs' affective states were not mentioned as areas of welfare improvement on farms. Of the farmers who associated animal welfare improvements with better infrastructure, 21% talked about adding air conditioning, and 25% about building new or bigger facilities to reduce stocking density in the growing and finishing phases (e.g., "*I think improving the nursery and finishing facilities. Improve our sows' barn; we could improve the flow of manure, make it drier*" – Farmer 15; "*... pigs with more space, because the looser they are the more welfare they have ... Building it from scratch*" – Farmer 23). The other 9% mentioned transitioning to group housing in gestation and 7%, adopting better hygiene and biosecurity practices.

Farmers' perception of management practices that influence animal welfare

Out of a total of 44 farms, 33 were breeding farms (breeding farms and farrowing to finish). Farmers' description of the management at nurseries revealed challenges for animal welfare. In general, farmers did not supervise births (except 22%) and only 49% registered neonatal mortality and its causes. Although they did not keep mortality records, 91% of the farmers identified crushing by the sow as the leading cause of mortality in newborn piglets. They also reported extensive use of stressful and painful practices, especially so in the first week of life, without applying any form of pain relief. All farms did tail docking within the first three days of life, 73% used tooth clipping and 60% of males were surgically castrated ("*At birth, we wear the teeth. Because if we don't, they hurt the sow's udder, they don't even suck*" – Farmer 18). Although during painful practices piglets received preventive medications for neonatal diarrhoea and arthritis, nothing was done to minimise the pain, because it was believed that such pain is momentary ("*…castration, tail cutting… It does hurt, sure. It's done without anaesthesia, without anything. But I think it's just a little, just when it's done (referring to the pain*" – Farmer 43).

Diarrhoea was the main concern for 89% (*For us it's diarrhoea, because the others don't happen here* – Farmer 16; "*Diarrhoea is more serious, because the piglet won't grow*" – Farmer 14). The factors they related to diarrhoea were temperature variation, poor hygiene, nutritional deficiencies and high stocking density (Table 4). When asked about potential causes of the dissemination of diarrhoea in weaned piglets, no farmer mentioned early weaning or mixing piglets from different origins (different farms, buildings, or litters) as risk factors.

Cross-fostering was performed in 80% of the breeding and farrowing to finish farms ($n = 33$) and in 86% of these it was done up to 24 h after birth. Farmers reported that this management practice could occur several times in the same lactation and among piglets of different ages. Some participants performed this practice whenever they noticed low weight piglets. Groups were made to match weight, although there was no standard management practice between the farms.

Some farmers left smaller piglets longer with nursing sows reserved for that purpose. Farmers gave conflicting reports regarding their satisfaction with this practice ("*I use surrogate sows. I reserve an older sow or two, almost ready to be weaned. It is time consuming, but if you do everything right it works*" – Farmer 19; "*We only use a nursing sow when we wean them, but the runts remain with the sow. We do it* (cross-fostering) *every Thursday… if we see some that are getting very behind, then we leave them longer with the sow. … but we see that it hardly pays off*" – Farmer 17). Cross-fostering also stressed the sows. According to some participants, the sows did not easily accept new piglets.

Farmers identified some management practices as unsatisfactory or stressful for animals, but necessary and inherent in pig production. For example, weaning was done between 24 to 28 days of age in 80% of the 33 farms that had piglets. Some farmers perceived the benefit for the piglets of later weaning ("*It depends on the weight, in general, it is at 24 to 28 days, sometimes later. But sometimes we wean piglets at 15 days with 7 or 8 kg – though it is not cool, because they go to the nursery and will suffer more because they are so young*" – Farmer 03).

The solutions for some of these laborious and stressful practices (for them and pigs) often involved the use of preventive medications, mostly antibiotics. Weaning was one of the stressors associated with the use of medications; all farms with weaned piglets (farrowing-to-finish, growing farms, fattening farms; $n = 25$) used preventive antibiotics in the feed. To relocate piglets to new fattening units, the pigs received antibiotics and anti-inflammatories in the feed and water. Farmers described that, at weaning, piglets were segregated by sex, mixed and loaded into a truck with piglets from different farms, to be transported to nurseries in the region or to farms belonging to integrators located in western Santa Catarina. In this case, the piglets could be transported over long distances, for up to 12 h of travel. Interviewed farmers in growing and finishing farms ($n = 15$) reported frequent use of antibiotics and NSAIDs to prevent fevers when receiving piglets ("*We use metamizole* (antipyretic and painkiller) *in the water when they arrive because they arrive with a fever, they are stressed because of separation from their mother, because of the truck, so we need to put something in the water*" – Farmer 39; "*In the pre-starter feed, amoxicillin* (antibiotic) *in the nursery, first tiamulin* (antibiotic), *then another shock at the beginning of the growth phase with tiamulin* (antibiotic) *and, at the beginning of the finishing phase, florfenicol* (antibiotic) *for 7 to 10 days*" – Farmer 17).

Some farmers reported using sedatives to make the sow calmer after farrowing ("*I make a medicine for the sow when she farrows; when she is in agony, she bites the piglets. But it is very little (medicine), 1 or 2 ml and she already calms down*" – Farmer 14; "*Uh 'Distress', you don't know it* (referring to a brand name)*? So, at farrowing, they get stressed, then you do the medicine, and she sleeps. She sleeps, and they keep being born. The right thing would be to do it later, but we do it like that*" (Farmer 03).

Abnormal and stereotypical behaviours are inherent to animal production and not a welfare concern

In general, participants did not consider abnormal or stereotypical behaviours frequent nor a relevant problem on their farms. Many participants considered all these behaviours natural and inherent to pig production: ("*If you don't have any of this in a farm, worry about something being wrong. (...) If you don't have cannibalism, tail biting (but you can't have too much!), if you don't have any of this, it's because you don't have any animals. This will always exist in the midst of animals*" – Farmer 59).

According to the participants the most frequent behavioural problem was excessive fighting, while for many belly-nosing and tail biting were not present or rarely observed (Table 5). Tail biting worried 11% of participants, given that it interferes with the productivity of the herds ("*Tail biting for sure, that's a doomed pig. He will always have inflammation, pus. If he's bitten when he's tiny, he will always have*

Table 4
Causes of post-weaning pig diarrhoea according to participants ($n = 20$).

Causes related to post-weaning diarrhoea[1]	Very related *n* (%)	Related *n* (%)	Somewhat related *n* (%)	Unrelated *n* (%)
Temperature variation	19 (95)	0	0	1 (5)
Nutrient-poor foods	15 (75)	3 (15)	0	2 (10)
Mixing of pigs of different origins	2 (10)	4 (20)	3 (15)	11 (55)
High stocking density	9 (45)	4 (20)	3 (15)	4 (20)
Early weaning	2 (10)	7 (35)	5 (25)	6 (30)
Poor hygiene	18 (90)	0	0	2 (10)

[1] Participants were presented a list of events potentially related to post-weaning diarrhoea and asked to assign a causal relationship according to their understanding (i.e., more or less related to the event).

Table 5
Frequency of occurrence of abnormal behaviours in the pig herds according to participants ($n = 44$).

Behaviour	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Fighting	36	45	18	0
Bar biting	30	22	18	30
Belly-nosing	16	20	25	39
Tail-biting	9	36	46	11
Dog-sitting (sows)	7	18	30	45

inflammation" – Farmer 50). Yet, belly-nosing and fights were considered to be of little relevance ("*…very little, but there are always two or three crazy piglets that need to suckle*" – Farmer 22) or natural to the species ("*They start playing and end up fighting, I don't know, like siblings*" – Farmer 16).

Participants had a similar indifference about abnormal or stereotypical behaviours of the sows. Only 33 of the farmers acknowledged seeing sows sitting in a dog position in their farms. The majority (61%) did not know the causes of the behaviour; with some participants pointing out sow genetics (12%), discomfort or pain (9%), or a learned habit (9%) as explanations. Likewise, some participants (30%) did not report bar biting in their sows ("*Here you don't see that anymore, but a few years ago it was quite common. I don't know why they did that, I thought it was genetic, but I don't know*" – *Farmer 17)*. Yet, others (30%) identified it as always present.

Most participants (45%) did not know or did not like to provide an opinion on why this behaviour occurred in the sows. However, others associated the behaviour with hunger or anticipation of food (36%); and a few (19%) with discomfort and pain, mainly in the preparturient period.

Participants often associated the occurrence of abnormal and stereotypic behaviours with nutritional or climatic failures (Table 6). According to farmers (69%), the leading cause of tail biting behaviour was a nutritional deficiency, more precisely lack of protein in the diet. They also associated belly-nosing with hunger, or lack of nutrition due to low quality of the weaning diet ("*It is common to happen at weaning, this is nutritional. Or because the first diet leaves something to be desired, like little milk in the feed*" – Farmer 18). Some identified separation from the sow at weaning as a possible cause for the belly-nosing behaviour ("*I don't know if it is that they miss the mother, or if it is a tantrum*" – Farmer 34).

Table 6
Causes of abnormal or stereotypical pig behaviour according to participants.

Behaviour	Reasons	*n* (%)
High frequency of fights ($n = 38$)	Mixing of pigs of different origins	16(42)
	Nutrient-poor foods	9(24)
	High stocking density	10 (26)
	Others	3 (8)
	Early weaning	0
	Boredom	0
Tail-biting ($n = 36$)	Nutrient-poor foods	25 (69)
	Temperature variation	4 (11)
	Stress	3 (8)
	Others	4 (11)
	Early weaning	0
	Boredom	0
Belly-nosing ($n = 20$)	Hunger	5 (25)
	Nutrient-poor foods	5 (25)
	Weaning (absence of mother)	5 (25)
	Others	5 (25)
	Boredom	0
	Temperature variation	0
Dog-sitting ($n = 33$)	Do not know	20 (61)
	Genetic causes	4 (12)
	Discomfort/ Pain	3 (9)
	Learn the behaviour from other sows	3 (9)
	Others	3 (9)
Sows bite bars ($n = 33$)	Do not know	15 (45)
	Hunger	12 (36)
	Discomfort/ Pain	6 (18)
	Genetic causes	0
	Others	0

Drivers of change

The main motivator for changes appeared to be demands from the industry. Farmers working for integrated companies or cooperatives explained that they were required to meet specific standards ("*One thing we have been hearing about animal welfare, especially from cooperatives and integrators, is that they want to end crates and turn all of these into group pens*" – Farmer 22; "*We have a project to make the entire system 'animal welfare' (...) ... for us to keep working, we need to go that way, if not, there is no way*" – Farmer 44). Some farmers showed dissatisfaction towards what they saw as unreasonable demands from retailers or integrators ("*The guy who invented this did not step on a farm. …he never mixed 60 sows in a pen just to see what happens*" – Farmer 33), even when acknowledging that they would meet the demands in the future ("*There is someone who creates the rules regardless of whether I am satisfied with them or not. It is the same as the issue of sows; I do not believe that putting the sow in a pen makes them calmer. But if we want to stay in the market, we have to follow the rules*" – Farmer 9).

Some farmers indicated that financial incentives for quality of production would be an important motivator or even a requirement for them to make improvements on-farm that benefit pigs' welfare (e.g., "*There is a lot to be changed in my farm, if I were to receive a label I would need to change everything around, improve the fences, I would have to improve ventilation, use less antibiotics. But for that, I would need to have an incentive, be paid more. If not, it doesn't work*." – Farmer 02; "*I would have to build housing for group gestation. But today, there is no bonus; the cooperative does not pay for group housing.*" – Farmer 42).

Farmers did not see a relationship between Brazilian consumers and demands posed by the industry and did not consider consumers as essential drivers of changes towards improving pig welfare ("*I don't think so… they don't follow it, they don't know what happens*" – Farmer 44). In general, they had negative attitudes towards consumers, and many farmers suggested a disconnect between urban consumers and the farming environment ("*…they don't even know where this is coming from. We* (farmers) *know*" – Farmer 29; "*… they don't even want to know who is raising them … they don't even know how it works, they've never been on farm, and they don't know how to raise a pig*" – Farmer 01; "*Last year we worked only in red, and I didn't see anyone in the media saying 'poor farmers'. They just say, oh, you have to produce cheap food. And let farmers work 24 h a day.*" – Farmer 37). Other participants accused consumers to be solely interested in quality or the price of products ("*… they just buy, they don't look at the label or the brand. If it's cheap they're buying it, and that's wrong*" – Farmer 50; "*The NGOs care. Do you think they (consumers) will know where meat comes from? They just want to know if it has quality … and if it has a label showing that there has been inspection….they don't even want to know where it comes from.*" – Farmer 62).

Some participants (22%) considered that there was a niche of consumers concerned with animal welfare, linked to NGOs movements, the trend for consumption of natural foods or veganism ("*I think nowadays they are a little more concerned. …it does not mean that it is a fashion, but this fitness fashion, more vegan people, more concerned with nature, I think they are paying more attention to this side: animals, torture and other things*" – *Farmer 25)*. Some expressed their negative attitudes towards animal welfare ("*A portion* (of consumers) *is very concerned about it. It is the "animal welfare people", who are just like that, who think of the case of tail docking, that the piglet will suffer. This is a fallacy; it is a lie* – Farmer 57).

Discussion

Animal welfare is a complex concept and, as such, researchers often dispute how to best portray the different angles involved (Broom, 1991; Fraser et al., 1997). For the pig farmers participating in this study, it was no different. They identified all the dimensions (affect, biological functioning and naturalness) that impact the welfare of a pig on a farm. However, their social reality, industry demands and available advice seem to have pushed farmers to perceive their range of action as limited to biological and environmental changes that might affect welfare. Stress in the pigs' life, as well as in their own lives, seemed normalised, even desensitising them to what should be read as abnormal. Thus, we observe a cognitive dissonance among attitudes, beliefs and behaviours towards animal welfare in this community, with negative consequences for the health and welfare of the animals, which were commonly alleviated by routines that relied on frequent use of medication, including high dependence on antibiotics. Expressions of social alienation and social isolation in the production chain were common voices among the participants in this study. This adds to the farmers' inability to see alternatives as viable solutions that could ameliorate their dissonance and improve the lives of the pigs they cared for, as well as their own lives (e.g., positive financial and environmental effects of reduced drug use).

Attitudes towards pigs' capacity for sentience and intentions to improve animal welfare

Farmers' attitudes towards pigs' capacity for sentience were generally positive, but this was not reflected in concerns about animal welfare or intentions to modify the production system. This contradiction between farmers' moral values and attitudes has been discussed by others (Bergstra et al., 2017; Peden et al., 2020). Many farmers thought that their farms already provided good standards of animal welfare. Although all participants believed that pigs are capable of feeling pain, they did not mention any intentions to control pain during management procedures. Like Canadian farmers (Spooner et al., 2014), the farmers in this study considered their practices to be acceptable, necessary, or the pain unimportant. Thus, farmers were sympathetic to the pain of the animals but did not show empathy, in that they did not try to avoid or minimise the pain. According to Fox (1985), sympathy and empathy are distinctly different phenomena. Sympathy implies the sharing of another's emotions, such as sadness and anguish, and involves feeling pity towards another's experiences of suffering. Empathy, on the other hand, involves more than pity, because it permeates the experience of another's pain and entails having the ability to understand another individual's emotion or sensory state and being able to have a painful experience through the pain of another person or animal (Singer et al., 2004). Sympathetic concern can be volatile, whereas empathic concern involves an objective, ethical and emotional understanding (knowledge) of animal behaviour or suffering. It is from this understanding that action, compassion and responsibility emerge (Fox, 1985).

Lack of empathy was also demonstrated in the normalisation or desensitisation towards stereotyped behaviours in the pigs. Farmers in general underestimated the occurrence of abnormal and stereotyped behaviours discussed during the interview. Belly-nosing, which can indirectly affect the development of weaned piglets (Widowski et al., 2008), was considered irrelevant. Tail biting was the abnormal behaviour farmers considered most relevant; even so, most considered it to be inherent to pigs and the production system. Often, not recognising the problem or underestimating its importance is a reason for not adopting preventive measures, as shown in the case of lameness in dairy cattle (Olmos et al., 2018). On the contrary, perception of aggression as a problem was related to British and Irish pig farmers' willingness to implement strategies to reduce it (Peden et al., 2019).

In our study, farmers showed an explicit contradiction between their beliefs and behaviours regarding the suffering of pigs and their motivation to adopt changes to reduce it. Although some study participants described feelings of discomfort about performing painful practices, this was not disruptive enough to counter behaviour traditionally established in the community. Cognitive dissonance is explained as a mental discomfort, triggered when two or more conflicting ideas or beliefs are sustained simultaneously; as people seek internal consistency or harmony, the dissonance is reduced by triggering social-physiological coping strategies (Festinger, 1962). The inconsistency between beliefs and behaviours can be explained through the theory of cognitive dissonance (Festinger, 1962). Many painful practices identified in our study (castration, teeth clipping and grinding and tail docking) are socially accepted in the farming community (Tuyttens et al., 2012; D'Eath et al., 2016; Valros and Barber, 2019) and seem anchored in the life experience of the local community (Cardoso et al., 2016). Belonging to a group that shares knowledge acquired through socially learned practices produces stagnation and limits the proposition of changes (Bassi et al., 2019).

All practices that we presented during the interview as possibilities to improve welfare or prevent abnormal and stereotyped behaviours, such as environmental enrichment, socialisation before weaning, or avoiding or reducing social regrouping were considered unacceptable by the farmers. These practices are scientifically recognised and have been proven to be effective (e.g., D'Eath et al., 2016; Peden et al., 2018). However, this information seems to remain inaccessible to farmers, confirming similar results with dairy farmers in the region of the study regarding dehorning (Cardoso et al., 2016) and lameness (Olmos et al., 2018). This implies ineffective communication between the scientific community, local advisors and farmers (Olmos et al., 2018; Peden et al., 2018; Valros and Barber, 2019). Rather than technical information, community led hands-on experience may speed change within a farming community (Winder et al., 2018). For example, in general, the attitudes towards group housing for gestating sows were negative among the participants, the exception being those who already were adopting the system. Likewise, some of the farmers that weaned at 28 days showed positive attitudes towards increased weaning age. Others have shown that successful experience with new practices may lead to more positive farmers' attitudes (Aluwé et al., 2015; Schukat et al., 2019; Valros and Barber, 2019). Here farmers with an entrepreneurial mindset found it easier to break societal norms/structures and dared to explore new avenues to improve their practice as farmers. This mindset is often dependent on their ability to see themselves as competent and with hope in the future (e.g. future generations to pass on the farm, better prices) (Buller et al., 2018; Fruscalso et al., 2017; Meijboom and Stafleu, 2016).

Farmers' understanding of animal welfare

We identified two key components of the social representation of animal welfare of these farmers – one biological and one economic. The first captures a subjective concept shared by many participants that animal welfare would equate to giving animals what they need for their survival, but not necessarily a life worth living. A similar focus on biological functioning and the living environment has been reported for intensive pig farmers in different countries (e.g., Kling-Eveillard et al., 2007; Benard and Cook-Buning, 2013, Spooner et al., 2014). Most farmers believed that avoiding disease (e.g. diarrhoea) and having productive performance is proof of high animal welfare, which is a widespread view among farmers and stakeholders in the livestock industries (Benard and Cook-Buning, 2013; Hötzel et al., 2018). Such limited conceptualisation of animal welfare precluded farmers from making associations between good health and the animal's ability to express a full behavioural repertoire. It also prevented them from viewing abnormal behaviours as problems and forms of management that give pigs more than the bare essential for survival as acceptable.

The economic element was expressed in negative attitudes towards effecting changes to improve animal welfare, underpinned in a shared

perception that improving animal welfare required investments that would not be repaid. Some farmers referred to animal welfare as part of a technological package imposed by the industry, and not necessarily legitimate. One example discussed by several farmers was group gestation housing, which many considered unnecessary or even detrimental for the sows' welfare, given the increased risk of fighting leading to sows' stress, a concern also raised by some Canadian farmers (Spooner et al., 2014). Farmers in many countries consider costs and investments as the main deterrents to implementing improvements in animal welfare on their farms (Brazil: Borges et al., 2019; Germany: Schukat et al., 2019; China: Sinclair et al., 2019; The Netherlands: Bergstra et al., 2017; Hungary: Molnár and Fraser, 2020). Additionally, it has been suggested that in many cases, the types of changes demanded to improve farm animal welfare may not correspond to the wishes and interests of society and the farmers (Bergstra et al., 2017; Yunes et al., 2018) perhaps turning the investment into losses (Weary et al., 2016).

Farmers considered diarrhoea the most critical welfare issue among the scenarios presented, possibly because it is directly related to production losses and increased production costs (Kauppinen et al., 2012). Although farmers agreed that stress is a predisposing factor for the occurrence of diseases, they did not make direct associations between stress in their pigs and health issues. Nor so to their need to use antibiotics consistently along with other drugs for several ailments/situations on-farm (see farrowing management practices reported). Yet, they more clearly saw opportunities to improve health with biosecurity measures. Indeed, biosecurity is an essential element in reducing antibiotic use on-farm (Postma et al., 2017). Still, management practices such as weaning at an older age, decreased stocking density, providing environmental enrichment and pain mitigation are also good alternatives to improve health. They act as preventive measures by reducing stress and strengthen the pig's immune system and thus may reduce health problems and the need for antibiotics.

Farmers–consumers disconnection

Farmers saw consumers as distant and unfamiliar to farming and, at times, even as a threat to their way of earning a living, thus not influencing their decisions explicitly. Like Dutch farmers in the study reported by Benard and Cook-Buning (2013), many farmers described consumers as greedy, uninformed or uninterested in how pigs are raised and how hard the lives of farmers can be. Some expressed frustration at the expectations of "unrealistic consumers" or pressure from third parties with conflicts of interest.

Farmers' focus on biological and environmental aspects is also in contrast with lay citizens in many parts of the world (Weible et al., 2016; Sato et al., 2017; Yunes et al., 2017 and 2018), who consider freedom to move and the ability to perform natural behaviours essential components of pig welfare. However, these different views regarding what constitutes good welfare do not arise from different values regarding the animals between these two stakeholders. Farmers' conceptualisation of animal welfare led them to normalise stressful practices and to blind themselves to the pain and stress of the pigs for whom they had sympathy. The inability to identify some production practices and abnormal behaviours as problems and the inability to solve them may emerge as cognitive dissonance. Yet, the worried citizens who see themselves as pushing for better production systems may read this as a lack of farmer empathy or total ignorance at its best, further creating mistrust between the stakeholders deepening the divide between farmers and consumers.

Still, a portion of farmers recognised that some consumers are interested in animal welfare and that this is an important segment to be considered. Some research indicates that Brazilian citizens are concerned with many issues present in the farms visited, such as the use of antibiotics, painful procedures (Yunes et al., 2019; Hötzel et al., 2020) and housing that limits pigs' freedom of movement (Yunes et al., 2018). Citizens' social representation of animals has changed over time (Cook, 2015), with many citizens reducing the consumption of animal foods, buying 'more natural' foods and even adopting more radical changes in eating habits, such as veganism (Heise and Theuvsen, 2017; Román et al., 2017; Valente et al., 2019). Following an international trend, retailers and industry in Brazil are making commitments to improve pig welfare (Yunes et al., 2017). Findings from this study suggest that farmers may not be sufficiently informed or engaged to allow them to promptly respond to consumers and to commitments made by these stakeholders, which can pose a severe economic risk for farmers.

Conclusions and moving forward

Although we identified many management and animal indicators of poor welfare (e.g., use of painful and stressful management practices and use of environments that limit the expression of natural behaviours), most farmers were satisfied with animal welfare standards at their farms. They saw no justification for further investments to improve it. These perceptions are aligned with the farmers' understanding of animal welfare, mostly comprising good biological functioning. Likewise, any changes they would consider making to improve animal welfare were related to productivity, such as biosecurity, climate comfort and infrastructure and many explained their perception that improving pig welfare is costly. Farmers are considered gatekeepers of the welfare of the animals under their care. To fulfil this role, they may need some autonomy, which seemed lacking in this group.

Increasingly, farm animal welfare is best described as a One Health/One Welfare issue (Buller et al., 2018). This approach forces us to understand and accept the complex interactions between human welfare, animal welfare and environmental issues that are related to animal production. First, many measures proposed to improve pig welfare conflicted with the farmers' perceived practical and economic realities and were not supported by their knowledge and technical skills. Second, to maintain pig health in such stressful environments, farmers relied on pharmaceutical drugs, especially antibiotics. Third, farmers reported living a stressful life and feeling at the mercy of 'irrational, greedy or selfish consumers', demanding companies and unfair rules. Altogether, the findings of this study indicate that, to improve pig welfare in intensive production systems, there is a need to (re)connect the different human, animal and environmental interests.

Supplementary materials

Supplementary data to this article can be found online at https://doi.org/10.1016/j.animal.2020.100154.

Ethics approval

The project was revised and approved by the Ethics Committees on Research on Humans (PP3.013.856) of the Federal University of Santa Catarina, Brazil.

Data and model availability statement

None of the data were deposited in an official repository. Data may be available upon request by contacting the corresponding author.

Author ORCIDs

MJ Hötzel: 0000-0003-1034-3202.
R. Albernaz-Gonçalves: 0000-0002-7999-0689.
G. Olmos 0000-0003-2497-1197.

Author contributions

R. Albernaz-Gonçalves: Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing.

G. Olmos: Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing.

MJ Hötzel: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of interest

We have no conflicts of interest associated with this publication.

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