

RESEARCH ARTICLE

For the future of pig farming: a transdisciplinary discourse organised as a future workshop

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HIGHLIGHTS

- We present here a transdisciplinary, professionally moderated and scientifically supported multi-stakeholder discourse organised to encourage new ideas for pig housing systems and management processes that aim at achieving future social acceptance.
- The aim is to provide inspiration for pig production systems that meet the basic standards of animal welfare, farmers' needs, and societal demands.
- Moreover, it summarises the experiences of the discourse process

KEYWORDS pig production, pig husbandry, animal welfare, future workshop, transdisciplinary discourse, social acceptance

Abstract

Germany is the largest pig producer in the EU, and many German farmers earn their living in the pig production sector. Current pig husbandry is characterised by intensive production systems, which have been subject to increasing public criticism over the recent years. Criticism often refers to the increased economic efficiency of such production systems and the simultaneous negligence of animal welfare and other sustainability aspects.

However, in order to ensure successful and sustainable pig production in the future, broad social acceptance of this sector is indispensable. In this context, the integration of different stakeholder groups into the development of new pig housing and management systems could be a promising approach. The present study provides results of a transdisciplinary, professionally moderated and scientifically supported multi-stakeholder discourse that was organised as a future workshop to encourage new ideas for pig housing systems and management processes.

Our study presents two types of results. On the one hand, it provides suggestions for pig housing and management systems that meet basic standards of animal welfare and farmers' needs as well as societal demands. On the other hand, it summarises the experiences of the discourse process that may inspire future planning and implementation of multi-stakeholder approaches in similar fields.

All developed pig housing and management systems have been agreed upon by all stakeholders involved and are characterised by enhanced space and mobility, separated functional areas, outdoor areas, continuous roughage supply, and organic materials for rooting and manipulation, as well as showers for the pigs.

1 Introduction

In recent years, livestock production has increasingly become the subject of extensive public criticism, with animal welfare turning out to be a focal point of interest in many European countries, including Germany (Bergstra et al., 2017; de Barcellos et al., 2013; Eurobarometer, 2016; Krystallis et al., 2009; Weible et al., 2016). Nowadays, sufficient and cheap food supply is no longer enough to legitimise livestock production (Clark et al., 2016; Grunert et al., 2018; Spooner et al., 2014; Vanhonacker et al., 2009; SocialLab-Konsortium, 2019). Rather, in order to meet long term social acceptance, not only economic considerations but also wider ethical requirements must be taken into account (Hölker et al., 2019; Hölker et al., 2019a; Janssen et al., 2016).

Due to economic, work safety, hygienic, or food safety reasons, pig production has evolved into one of the most efficiently organised processes in animal production. However, the requirements of those production processes prevent

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animals' natural behaviour. For a sustainable future of German pig production, pig farming practices and societal demands for more pig-friendly housing and production systems must be brought together.

According to several surveys of pig-producers, many conventional pig farmers in Germany face the challenge of adapting their production systems to societal demands, farmers' and animals' needs (ISN, 2018). Talking to pig farmers, it becomes obvious, that many of them put a lot of passion into their work and are sensitive about topics related to livestock production (Wildraut and Mergenthaler, 2018; Wildraut et al., 2018a). They are fully conscious of the fact that their work is increasingly monitored and discussed by society at large. Currently, however, there are many conflicting goals and legal hurdles which hinder pig farmers from adapting their housing systems to public demands.

For example, more space and mobility for sows is linked to rising piglet mortality (Grimberg-Henrici et al., 2018; Grimberg-Henrici, 2018a), which is not only detrimental to the piglets' welfare but also has an economic impact. Moreover, in most regions with dense pig production, the provision of outdoor access is often not possible due to emission regulations (Keck and Schrade, 2014; Mielke et al., 2015; Vermeer and Hopster, 2018). Increased space for individual animals, enriching elements or showers, the provision of organic material and roughage seem to be too expensive at current price levels (Dawkins, 2017; DLG-Kompakt, 2019; Winkel and Heise, 2019).

Against this background, a transdisciplinary, professionally moderated and scientifically supported project (2017 to 2019) was initiated to deal with the following question: how should conventional pig production be designed in future in order to enhance animal welfare, meet social acceptance, and at the same time realise practicable solutions for farmers?

The aim of the present study was twofold:

1) to develop virtual pig housing and management systems for all production stages, taking into account animal welfare needs, social demands, and farmers' needs as well;

2) to find out whether a transdisciplinary multi-stakeholder approach, such as a future workshop, is a suitable method for the development of new housing systems in livestock production.

In the next section, the project's approach following the methodology of future workshops as well as the project's process are presented. The results section is divided into a subsection describing the developed concepts for future pig production systems and a subsection summarising the discourse of process experiences. The limitations of the project are outlined before the conclusion and implications section.

The paper addresses farmers as well as policymakers and other stakeholders, who are willing to participate in the development of pig production systems that are aligned with social demands as well as animal welfare and farmers' needs. Furthermore, it is intended for all those who are interested in the use of qualitative transdisciplinary discourse approaches in the field of livestock production.

2 Approach

The project was designed as a future workshop to initiate and enhance a structured and professionally moderated transdisciplinary multi-stakeholder discourse. The method of future workshops is renowned for its facilitation of discursive multi-stakeholder processes in many different public fields of interest. Future workshops are a method of participatory research when multiple stakeholders are asked to develop a vision of the future in an atmosphere designed to promote creativity (Jungk and Müllert, 1989).

Apart from the four main phases (introduction, critique, utopian, and realisation phase) a future workshop usually includes, the project presented in this study (2017 to 2019) comprises an additional fifth phase (finalisation phase) shown in *Figure 1*. All five phases were scientifically supported, evaluated, and documented with written minutes and audio

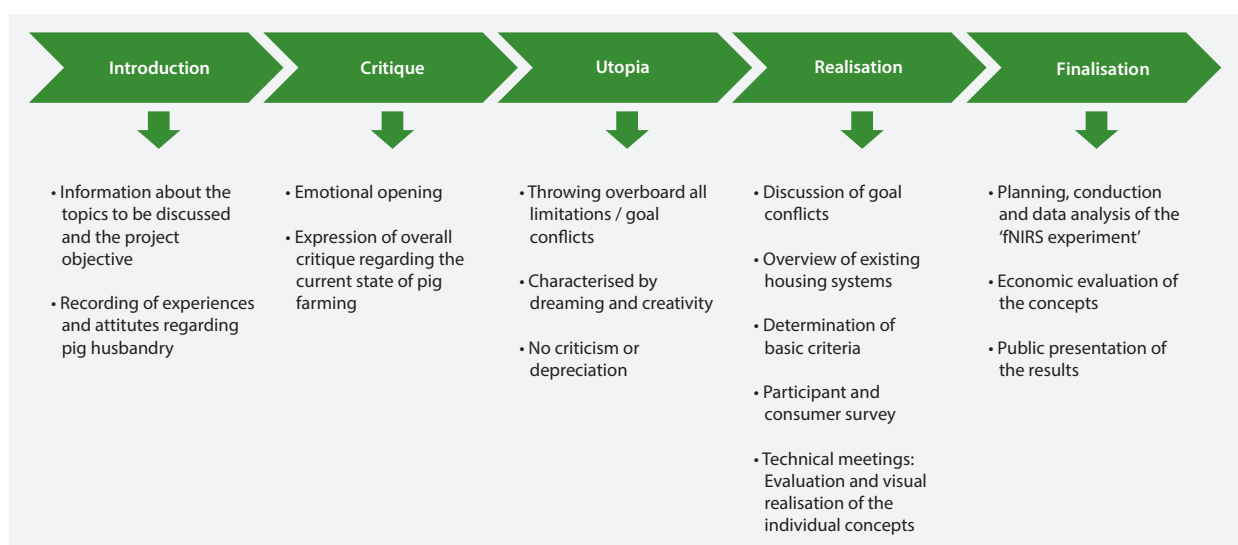


FIGURE 1

Overview of subjects discussed during the individual project phases (Source: own compilation 2020)

and graphic recordings. A total of eleven workshop days were organised, spread over the different project phases. The subjects discussed during the individual phases are shown in *Figure 1*. All of them were professionally moderated, which ensured a neutral approach and balanced handling in the performance of workshop participants. Moreover, the leading project scientists could concentrate fully on the preparations for the workshops, their evaluation, the follow-up, planning the next steps, deciding on the participant composition, as well as the coordination and briefing of the professional moderator. The scientists qualitatively analysed each workshop phase, triangulated the results achieved with other experts and participants, and then added information to the discussions from literature research.

The project partners were members of three disciplines (animal production and breeding, agribusiness/agri-food marketing, and neuroscience marketing), a leading pig farmers association, and a pen construction company.

The selection criteria for workshop participants were defined in agreement with all project partners and included socio-demographic aspects, soft skills, and discussion expertise. Each of the participants received an incentive for their participation in addition to a travel expenses allowance. The invited workshop participants made up a transdisciplinary, multi-stakeholder group of German pig production, including pig farmers from all production stages, members of agricultural chambers, and consultants and experts in both pig production and pen construction. There were also scientists from different fields such as precision livestock farming, agribusiness, marketing, ethics, consumer and market research, and representatives of supermarket chains. Many participants were invited to all workshops, but some only to specific ones according to their field of expertise. On average, twenty people took part in each workshop.

The introduction and critique phase workshops were held with two different participant groups: one with farming stakeholders only and one consisting of consumers and marketing experts. All the following workshops were held with heterogeneous stakeholder groups.

The utopian phase was used to construct ideas of how to overcome the already identified current critical situation in conventional pig production. The main idea of the workshops here was to throw overboard all usual restrictions and limits and to encourage free associations, dreams, and utopian ideas instead. These ideas had to become more realistic and feasible only in the following realisation phase of the future workshops. The task of this phase was to identify techniques for implementing the ideas and figure out how goals that might conflict could still be met.

In order to concretise the actual design of the developed ideas for pig housing concepts, a special working group was established. This consisted of participants of the future workshop with special technical and practical expertise such as farmers, pen construction experts, members of agricultural chambers, and researchers. In total, five so-called technical meetings were held in order to enable appropriate consideration of all aspects that are important for the concrete technical realisation of the housing concepts. Although the

primary focus was on animal welfare, social demands and feasibility aspects were also taken into account and, subject to the clarification of questions regarding financing and approval, virtually realised with current technical means.

The feedback from the technical meetings in the form of precisely developed housing concepts were presented to all the other future workshop participants and jointly discussed. This feedback process took place several times, so that all participants could agree on the final housing concepts.

In addition to the workshops and technical meetings, two surveys were conducted to support the feedback process and provide additional information and inspiration to the workshops. First, in October 2018, an online survey with German residents was completed in order to identify the degrees of acceptance of several conventional and innovative pig production processes and concepts. Moreover, citizens' attitudes towards different conflicting goals in pig production (animal welfare vs. resource protection; animal welfare vs. costs) were analysed. The participants were selected using quotas representing average German population by gender, age, school leaving qualifications, and size of the place of residence. The sample comprises 1.101 datasets that were analysed. The analysis showed that 73% do not perceive current conventional pig production as animal welfare friendly. The main reasons stated are the lack of space and outdoor access, the lack of straw and other organic litter, as well as the perceived bad treatment of animals. Eighty percent of the citizens surveyed are of the opinion that current circumstances of pig production need to be changed to a more transparent system. Notwithstanding their clear demands, citizens appreciate that many of their expectations might not be met.

These results are also shown by other studies confirming citizen demands for the physical integrity of pigs, a more natural environment for them (especially the ability to show natural behaviour such as rooting and wallowing), and animal-friendly interaction in pig production no matter what the consequences are for the farmers (efficiency, work safety), the environment, and resources (Dawkins, 2017; Rovers et al., 2018; Ryan et al., 2015; SocialLab-Konsortium, 2019; Sonntag et al., 2017; Sonntag et al., 2018).

Secondly, in October 2018, an online survey was conducted, which all thirty-six active future workshop participants completed. In addition to content-related aspects of the housing concepts to be developed, the survey included questions on the chosen discourse method. Important findings were made in two respects: on the one hand, content-related results were analysed and included in the further discourse process, which contributed significantly to the development of the housing concepts. On the other hand, results showed that most of the participants consider the future workshop method as a suitable instrument in developing new housing systems for pigs and other farm animals. They would also participate in follow-up meetings or similar projects. This overall positive evaluation could be important in terms of planning future multi-stakeholder discourses processes concerning livestock production.

During the finalisation phase, the project report, final presentation, and public relations work was done.

3 Results

3.1 Developed housing and management systems for all production stages

As only a holistic approach could ensure pig welfare throughout their whole life cycle, housing and management concepts were developed for all production stages, from pregnancy and farrowing pens to pens for pigs fattening. Several versions for each production stage were designed. These are presented in the simplest way in order to maximise individual inspiration. A customised analysis of advantages and disadvantages has to be done, of course, before realising any of the housing systems. Here, we refrain from this due to the considerable heterogeneity of German pig production systems, as well as different economic and regional characteristics of each concept.

In the following, the key elements of the developed pig housing and management systems are presented as visualisations (*Figure 2*) and described in more detail. Pig farmers therefore have the opportunity to choose housing concepts according to their individual needs. All concepts have been planned as new constructions rather than conversions. However, individuals could check and calculate whether converting old buildings could be viable. For this purpose, an Excel tool was developed to calculate individual construction costs per m² or per animal, for both piglet production and pig fattening. The calculation tool is available on the project homepage (<https://www.uni-goettingen.de/de/575789.html>) and can be used by any interested farmer. The idea of the project was less to develop designs for pigsties, which are planned down to the last detail, but rather to provide inspiration and a few practical design options for pig housing and management concepts. Due to the strong individual characteristics (e.g. regional differences) of the farms, several key elements were included in order to provide a basic guideline for farmers. However, final and more detailed design and investment decisions have to be taken by each farmer themselves according to their specific needs.

Key elements that all developed housing concepts must include:

- Increased space and mobility for pigs and lower stocking density:
Sow and piglets: a limitation of the fixation time of sows to a few necessary (in terms of work security) days. The farrowing pen should be at least 6 m². It should be an oval space for the sow (2 m x 1.60 m) to turn around in the pen freely and to express nesting behaviour. The space is larger than in current conventional standards in German systems but not too big so that piglets remain safe and do not lose their orientation.
Fattening pigs: each animal has more than 1.1 m² space so that producers can receive the second level of the German animal welfare label.
- Separated functional areas for eating, sleeping, defecating, and being active.
- Outdoor access for all pigs above 30 kg weight.
- Continuous supply of roughage and organic materials for rooting and manipulation.

- Showers (at least for all fattening pigs).

Individual options can be selected for the following areas listed below.

- **Concepts for the service area** (which all aim for the shortest fixation period for sows):
 1. Approximately 70 cm wide places to eat and lie down when the sow is only fixated for insemination.
 2. Approximately 75 cm wide places to eat and lie down in several classes when the sow is fixated for 5 to 10 days.
 3. Insemination in the group (constant group). Sows are restrained for as short a time as possible and have more space and access to the outdoor area.
 4. Insemination in the farrowing pen. This allows the sows to stay longer with the piglets and does not require them to change pens.
- **Concepts for the pregnancy area (pregnant sows):**
 1. Separated functional areas, barn area with slatted floor, an outdoor area (see *Figure 2a*).
 2. Separated functional areas, barn area with slatted floor, an outdoor area (useful as pregnancy area and bearing area), constant group of sows.
 3. Separated functional areas, barn area with slatted floor, no outdoor area, straw bedding, open house, natural ventilation, constant groups of sows.
 4. Automated sow feeding system, barn area with slatted floor, deep straw bedding, natural ventilation.
 5. Automated sow feeding system, barn area with slatted floor, forced ventilation, an outdoor area.
- **Concepts for the farrowing area:**
 In total, various variable-restraint pens with a size of at least 6 m² and a group pen for nursing sows with an option for an outdoor area were designed:
 1. Variable-restraint pen without an outdoor area
 2. Group pen for nursing sows with an option for an outdoor area and a flap for piglet management options are (see *Figure 2b*):
 - a. Twenty-eight days of suckling, afterwards weaning of the piglets and putting them in the flat deck.
 - b. Thirty-five days of suckling (piglets can stay longer with the sow and have extended suckling time), after that piglets stay 2 to 3 days without the sow in the farrowing area.
 - c. Thirty-five days of suckling (including insemination in the farrowing area). Piglets can stay longer with the sow, have extended suckling time, and due to the insemination in the farrowing area there is no need to change the location of the sow.
 - d. After 1 or 2 weeks of suckling in the „family area“ sows and piglets have access to a group pen with an option for an outdoor area.
- **Concepts for fattening pigs:**
 1. Two-rowed open-air barn but without an outdoor area (see *Figure 2c*).
 2. Open-air barn with a courtyard.
 3. Large groups with an outdoor area.

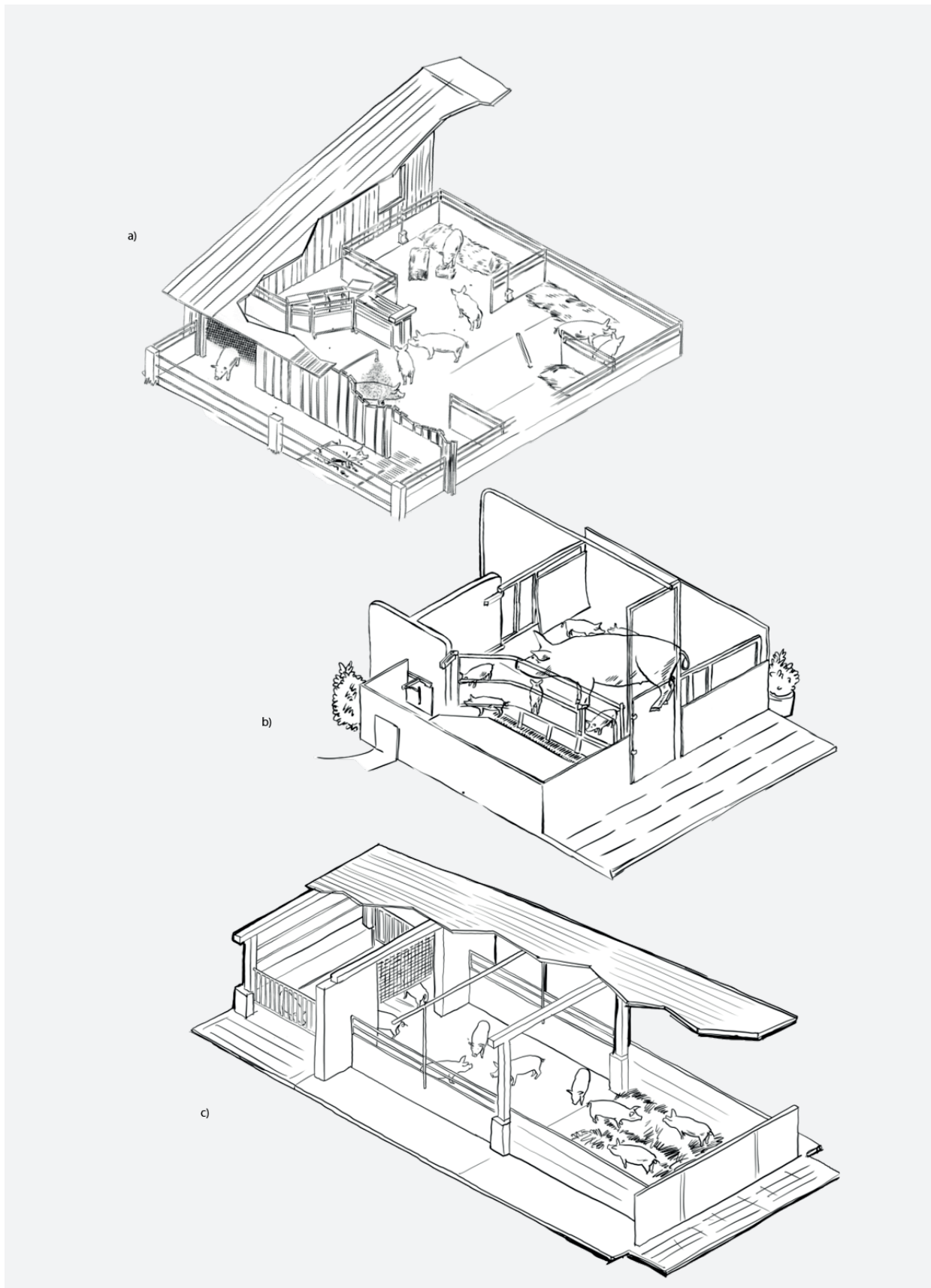


FIGURE 2
Exemplary sketches of developed pig housing concepts (described in more detail vis-a-vis):
a) pregnancy area; b) farrowing area; c) pig fattening area
(Source: Flaneur.de / Windisch 2019)

3.2 Experiences from the discourse process

All of the concepts presented for future pig housing and management were mutually agreed upon by the members of the diverse group of stakeholders involved in the intense transdisciplinary discourse that was organised as a future workshop from 2017 to 2019.

One of the first consensual decisions was to focus the entire process of the project on animal welfare needs since it has been shown that there is a general agreement among farmers, citizens, and scientists that the level of animal welfare in pig husbandry could be improved. One of the main demands of farmers as well as citizens is to reduce the number of iron construction parts in barns, especially in the farrowing crate. However, this demand could not yet be met. In the short term, it seems very complicated to reduce the fixation of sows due to workload and safety. Nevertheless, this issue has to be addressed in the long term specifically through breeding, changing management processes, farmers' working attitudes, or future technical developments.

Concerning the defined key elements which all concepts must include, the experiences from the discourse have shown that farmers' first reaction was often related to financial aspects, followed by scepticism about technical solutions and the added value of marketing. While farmers often focus their interest concerning pig production on performance aspects, citizens often argue from a perspective focusing on more natural production. They wish pig production to be as natural as possible, having in mind pictures of happy rooting pigs, sows in close contact with their piglets etc. They conclude that if animals have had a good life, the resulting products must be good as well. There is still a great need for mediation between the different stakeholders' views and for explaining the relationship between production costs and impacts on sustainability. It will be important to find neutral and trusted communicators that are uninfluenced by lobby from any side.

The main public demands concerning animal production, such as more space, access to outdoor areas, organic material, and the possibility to express basic natural behaviour patterns, are not at all new. However, it still seems to be very hard for pig farmers to recognise them as a chance for future development instead of critique. Long term changes in societal values and the human-animal relationship are not yet fully realised by the sector's stakeholders. Many still do not feel their license to produce to be in danger. From the farmers' perspective, there is a widespread distrust of public demands because consumers are accused of not behaving according to their stated attitudes. Moreover, citizens are often unable to define their demands in exact terms. From the citizens' perspective, production side stakeholders are often accused of not keeping their promises. They might speak of outdoor access but in reality only provide a continuous supply of litter, meaning a minimum of organic material and not straw *ad libitum*. Clear definitions, explanations, and well-designed communication might help, but solutions often remain missing. Moreover, there are several goal conflicts alongside public demands. For example, providing outdoor access for all pigs above 30 kg seems at first sight to be

very beneficial for their welfare. However, it might well bring about other problems, such as emissions, questions of animal health and food hygiene. Therefore, there is still a pressing need for future research and political decisions to further develop German pig production in a sustainable way.

3.3 Limitations

Due to the fact that economic aspects of the concepts presented here have been widely neglected for the sake of creativity and innovative discourse, it cannot be taken for granted that any of the concepts could be realised by an average producer without financial support or price adjustments. Moreover, the construction of pens with outdoor access will probably remain very difficult in the near future due to regulatory hurdles.

Besides the consensual concepts presented here that were developed during a multi-stakeholder discourse, there were also versions of them which would only be possible for some producers or could only be feasible in the long term.

4 Conclusion and Implications

The complex problems of current pig production in Germany cannot be solved by simply changing barn construction or production management concepts. The results of the project show how much more still has to be done in changing stakeholders' perception about the sustainability of the sector. In the highly emotional debate about the future of pig production in Germany, it is important to find solutions in a timely manner that disperse the current backlog of investments and bring planning security for farmers concerning political decisions, regulations, as well as their financial situation.

The methodology used in a future workshop has helped to clearly structure the discussion process. In the participant survey, the majority confirmed their satisfaction with the project structure and organisation as a future workshop. Thus, the consensual definition and realisation of future pig production concepts in the course of a transdisciplinary discourse process, can be suitable as the first step towards a more socially accepted pig production.

However, animal welfare measures that are only slightly better than the current legal standards will not maintain nor restore social acceptance. Fundamental changes in conventional pig farming combined with a reduction in the number of animals raised are necessary instead. This requires a rethinking on the part of pig farmers, with the focus on the well-being of their animals and a change in marketing channels. Environmental law and agricultural law must go hand in hand to achieve solutions. The agricultural sector and politicians should not just leave these challenges for future generations but dare to think in a visionary manner now. Clear political decisions concerning support for future pig production and solving goal conflicts have to be made now. The results of this project, as well as the wide stakeholder network built during it, can support this by maintaining and deepening public discussion about sustainable pig husbandry in Germany in the future.

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