Feature Article

Pictures in public communications about livestock farming

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Introduction

The ban of cage-rearing systems for laying hens in the European Union on 1 January 2012 (Council Directive 1999/74/EC) marked a turning point in animal welfare discussions and legislations. Although cage systems were often rated more sustainable with regard to their life-cycle assessment (Williams et al., 2006) and animal health (Lay et al., 2011) compared with non-cage systems, conventional cages were abandoned in the EU due to animal welfare concerns. The limited ability of birds to perform species-appropriate behavior in cages (Williams et al., 2006; Lay et al., 2011) was ranked more important by policy makers and led to an abolishment of conventional cages in the EU.

This development has not at least evolved due to public pressure. NGOs raised tremendous public awareness using pictures, which are usually remembered faster and more persistently (Childers and Houston, 1984) and have the potential to transport emotions more effectively (Kroeber-Riel and Esch, 2011). Pictures of battery cages were massively used in the media discourse and succeeded. In qualitative and quantitative consumer research that was conducted in Germany in 2015 and 2016, some years after the ban of battery cages, we observed consumers describing the current production nearly exclusively as battery cages (Sonntag and Spiller, 2017) which demonstrates the persistence of the images. Scientific evidence of environmental and health advantages in conventional cages, as highlighted by many animal scientists back at that time, were not able to overcome the deterrent effects and impacts of pictures and videos showing caged hens.

The battery cage ban example shows impressively the strong power of pictures in public debates that has been underestimated, and still is, within the agricultural sector. However, studies analyzing public perceptions of pictures showing different husbandry systems are comparably scarce. We argue that a better understanding of how pictures of husbandry systems in livestock farming are perceived by the average person would help the sector to understand public opinion more deeply. It could further help to design future husbandry systems that are appreciated and supported by the public. We do not expect husbandry systems to be designed solely to meet the needs of consumers, but completely ignoring them is likewise misguided, as has been observed in the past.

Research About Picture Perception by the Public

There is a growing, but still limited, body of literature from Germany that illuminates how people perceive pictures of livestock farming. We want to highlight the main findings of this comparably new branch of research.

In a study questioning German residents, public perceptions of pictures from intensive broiler fattening barns are analyzed (Busch et al., 2015). Pictures of chicken that are housed in a conventional broiler barn with 40,000 animals on a floor system were taken at different days during the production cycle (day 1, 7, 34, and 40) and with a reduction of stocking density at day 34 (32 vs. 39 kg/m²). All in all, the five pictures were rated very negatively in many aspects such as health and cleanliness of the barn, allowance for expressing appropriate behavior, and care provided to the animals. Reduction of stocking density did not lead to a differing perception of the picture. Only the...
picture showing day-old chicks was rated more positively. This may challenge communication of slightly reduced stocking densities as welfare improvement because they are not obvious to lay-people in visuals.

In another German study, the effects of different photo shoots showing the same circumstance were analyzed (Busch et al., 2017). Therefore, three pictures of the same pen for fattening pigs were taken and they varied in perspective (birds’ eye, human, and pig perspective) as well as in time of recording. This led to the animals being in different positions on the picture. Using a student sample, the results revealed that agricultural students evaluated the three pictures of the pen the same whereas students without connection to agriculture were sensitive to the variations in perspective and position of animals. Lying animals were associated with illness and lay-people rated space allowance much better in the picture taken from a birds’ eye perspective. In addition, around 20% of respondents without connection to agriculture remembered straw on two pictures, although there was none in the pictures. This example shows that people use existing frames (such as “pigs usually should live on straw”) to classify the scene on pictures which may have led to this influence on recollection.

Using video sequences from conventional pig fattening, Wildraut et al. (2015) conducted group discussions with German participants. The participants were unsure about how to evaluate the videos when the pictures remained uncommented. A variation in the videos also revealed that camera guidance, stocking density, and incidence of light influenced the perception.

Wille et al. (2017) used a combination of pictures and texts in the form of an information flyer to inform German participants about pig transportation. The results show that receiving information slightly improved participants’ perception compared with a control group receiving no information. Although a small improvement is achieved, the overall assessment of pig transportation remains very critical.

Sonntag et al. (2017) used in-depth interviews in order to analyze peoples’ evaluation of trade-offs in pig farming, applying a picture-based information approach. Slatted floor, gestation crates, and outdoor access were taken as examples to illustrate trade-offs such as farm economics vs. resting comfort (slatted floor), losses of piglets through crushing vs. limited mobility of the sow (gestation crate), or rooting possibilities for the animals vs. higher worm infestations (outdoor access). Pictures were used in order to ensure that lay-people got an adequate impression about the three topics. Participants were open for information and arguments in favor of the slatted floor, given the fact that they were unaware of trade-offs. In the case of gestation crates, participants’ concerns regarding the welfare of the sow could not be expelled by providing positive aspects of the system such as less piglet losses. “Factory farming” was also mentioned by participants in the discussions, and it was demanded that this type of farming is abolished in the future (Sonntag et al., 2017).

Möstl and Hamm (2016) analyzed the perception of webcam communications from pig fattening by people from the broader public in Germany using a qualitative approach. Although participants welcomed the idea of an open and transparent communication, webcam pictures from pig fattening could not enhance acceptance of the system. Little space and fully slatted floors were criticized. Another study using a quantitative online survey in Germany comes to similar conclusions (Gauly et al., 2017). The perception of webcam pictures supplemented by two different information texts on pig fattening and farrowing pens was analyzed. In this case, the majority of respondents rated pig fattening and farrowing pens more negatively after having seen the pictures and texts compared with before. This holds especially true for participants who received a neutral information text, whereas more emotional texts written by the farmer led to a slightly better perception.

**Comparison of Different Housing Systems on Pictures**

Up to now, how pictures of different housing systems are perceived and how they are evaluated by people of the public has not been analyzed. Especially, there are no systematic comparisons of different common systems. In order to fill this gap, Kühl et al. (2018) conducted a study in which different housing systems for dairy cows, fattening pigs, and broiler chicken were compared using a picture-based approach. In April 2016, 1,074 German residents were questioned online regarding their perception of four different husbandry systems for each of the three species. Each respondent was assigned to one species mentioned above (either dairy cows, fattening pigs, or broiler chicken) and evaluated the four different husbandry systems, namely indoor housing, outdoor climate stable, stable with paddock, and stable with pasture access. The systems were always presented as a combination of four pictures and a short explanatory text and they were presented in randomized order. Figure 1 demonstrates how the husbandry systems were presented using fattening pigs as an example. Picture and text combinations for the other species were designed accordingly.

After having seen a picture and text combination, participants were asked to evaluate each husbandry system with regard to different aspects, including perceived animal health, animal welfare, provided care for the animals, and product qualities deriving from that system. Based on an exploratory factor analysis (principal component analysis), an overall evaluation score was built that included 11 evaluation statements. In addition, participants were asked to state their overall acceptance of the four systems. Figure 2 shows the participants’ answers for the overall acceptance of the different housing systems for dairy cows, pigs, and chicken. For all three species, similar evaluation patterns are observable. Systems with pasture access gain the highest acceptance while the indoor systems gain the lowest acceptance values. The two intermediate systems, outdoor climate stable and stable with paddock access, lead to a notable increase of uncertain answers for all species (around 30–40% of participants show uncertainty about how to evaluate these two systems). This can be due to different reasons one of them possibly being unfamiliarity with the system, and coming with this, a perceived lack of ability to judge possible impacts on the animals in such systems.

Looking at the detailed evaluation of the systems that are bundled in the evaluation score (Figure 3), it can be seen that fully
Indoor housing

The pigs are always in the stable. They can move freely and are kept together with other pigs in a pen. The stable has solid walls with closed doors, gates and windows. Ventilation systems and air conditioning regulate the climate independently of temperature and humidity outside.

Outdoor climate stable

The pigs are always in the stable. They can move freely and are kept together with other pigs in a pen. In addition to a normal stable, this stable provides access to outdoor climate (natural weather conditions: sun, cold, wind…) through open sidewalks. To protect the animals from e.g. wind, special curtains are supplied on the open sidewalks. Lying and resting area are thermally insulated or littered. The pigs can visit climatic zones in the stable.

Stable with paddock

The pigs are always in the stable. They can move freely and are kept together with other pigs in a pen. In addition, they can use an outlet if they want during the whole year. The outlet is affiliated to the stable and is often concreted and not always littered with straw. The outlet is open-air or partly roofed. It offers the possibility to the animals to change location and climate, as soon as weather conditions are appropriate.

Stable with outdoor housing

The pigs are kept in a stable for a certain time. They can move freely and are kept together with other pigs in a pen. In addition, they live outdoors on a fenced pasture or natural flooring for a certain time of the year. There they have huts to provide shelter from the weather. The can move freely on the pasture/natural flooring together with other pigs according to their needs.

Figure 1. Texts and pictures of the four pig husbandry systems used in the study. Source: indoor housing: Landpixel; outdoor climate stable: Bildungs und Wissenszentrum Boxberg; stable with paddock: Landpixel, KTBL Stephan Fritsche; stable with outdoor housing: Landpixel.

Figure 2. Overall acceptances of four different housing systems for broiler chicken (n = 360), fattening pigs (n = 356), and dairy cows (n = 358) within the public. Source: Author calculations using data from Kühl et al. (2018).

indoor housing for cows is rated more positively compared with indoor systems for pigs and broiler chicken. For dairy cows and broiler chicken, the evaluations of the other three systems follow a similar pattern: the more extensive the outdoor contact gets, the more positive are the perceptions of the system. However, the trend differs for pigs. The evaluation of the outdoor climate
stable and the indoor housing with paddock is the same for pigs. Participants do not see differences regarding the impacts of the two systems, at least from the information provided. In addition, the system with pasture access for pigs gains the best values in total, whereas indoor housing for pigs is evaluated the worst system of all. The variation within the evaluations of different systems is, therefore, the highest for fattening pigs.

All in all, the results reveal that indoor systems are evaluated quite negatively and that there is a striking preference for outdoor systems within the public. The two systems that lie in between indoor and outdoor housing (outdoor climate stable and stable with paddock) trigger more uncertainty within the participants compared with the end of the scales used in this study. These results show far-reaching risks for the development of the sector.

### Possible Reasons for Picture Perceptions

If we consider the underlying reasons for the criticism of husbandry systems and rejection of indoor housing that are reflected in picture perceptions, there are several aspects to mention. One important point is peoples’ preference for naturalness in husbandry systems including space and freedom to move, as has been shown in several studies (Clark et al., 2016). This is simply to say the more natural a system looks, the better its perception. Outdoor access is often referred to as the most natural system by laypeople because people have the opinion that it allows the animals to perform natural behavior, provides access to unadulterated feed, and has positive impacts on animal health (Clark et al., 2016). Therefore, outdoor access plays a key role in the animal welfare debate of husbandry systems because it is the most obvious criterion for lay people to judge the naturalness of a husbandry system and is easy to detect, also on pictures and videos.

Another aspect that contributes to explain the more positive perception of systems with outdoor access is the change in human–animal relationships in Western societies. Pet animals have reached the status of family members for many people, ascribing equal rights and human needs to them and leading the pet food sector, for example, to already promote gourmet and probably soon animal welfare-labeled meat (Pirsich and Theuvsen, 2017). Although the cognitive and emotional abilities that people ascribe to animals increase or decrease according to the phylogenetic scale (Hills, 1995), peoples’ perception of animals’ ability to experience emotions such as grief is depending on owning a pet themselves (Walker et al., 2014; Morris et al., 2012). Such anthropomorphic trends also have an impact on peoples’ perceptions and relationships with regard to farm animals. Having contact to fresh air and the choice of being in different locations for example, aspects that are perceived as being important for the welfare of human beings, are transferred to non-human–animal needs and are strengthened by the experiences with companion animals. Both contribute to the importance of outdoor access as a key indicator for positive welfare.

Furthermore, the size of farms plays an important role in peoples’ perceptions. Large farms are often judged very negatively with regard to animal welfare levels by the public (e.g., Krystallis et al., 2009; Tonsor et al., 2009), although such a simple linear relationship between increasing farm sizes and compromised welfare cannot be supported by scientific studies (Robbins et al., 2016). Nevertheless, for larger farms, it is often harder to provide outdoor access (Robbins et al., 2016), which is possibly also recognized by the public. If this is the case, size is not the direct reason for rejection but acts as a mediator for intensive systems with a lack of outdoor access, commonly referred to in debates as “factory farms” and connected to low welfare levels in public perception. In addition, care that is provided for animals plays an important role for many people when judging livestock farming (Clark et al., 2016) and large farms may score worse in terms of care from a public point of view. People may perceive a detachment between farmers and individual animals, which is expected to be higher on larger farms. Furthermore, negative environmental impacts such as emissions are commonly discussed with reference to large numbers of animals, which may also contribute to the negative image of larger farms within the public.
Underlying Psychological Mechanisms

If we consider how people process information about livestock farming, this can help to understand the critical perceptions. If people need to judge information that they encounter, especially in complex contexts such as livestock farming, they apply existing “mental models” to organize information and make sense out of it. Such mental models can differ largely between individuals, especially between experts and non-experts (NASEM, 2017). This means that they apply different frames of reference to form an opinion. Animal scientists, for example, may use measurable indicators such as performance, health, and hygiene as a primary frame to judge a husbandry system. Contrastingly, citizens may use more heuristic approaches (which sometimes may be right and sometimes wrong) such as perceived naturalness, emotions, or analogies from other fields (NASEM, 2017).

Lay people often show relatively manifest cause-and-effect models with regard to specific topics (Furnham, 1988). Such lay theories (also intuitive theories) can but must not be based on scientific theories and results. They can be right or wrong and are the results of many influencing factors such as media reporting, everyday experience, plausibility assessments, common sense, and scientific studies. Figure 4 illustrates a lay theory for explaining why meat from “factory farming” is considered unhealthy. The results are derived from group discussions with German participants in 2015 (Sonntag et al., 2018a). According to this lay theory, factory farming implies the keeping of many animals that have little space. Therefore, diseases spread quickly and make the use of antibiotics necessary to keep the animals healthy. All animals in a barn need to be treated because of little space and the disease spreading so quickly. Mixing the antibiotics with the feed is the common method used to treat the animals. Meat that derives from such a system is contaminated with antibiotics and cannot be healthy.

All in all, diverging values and norms between people from the public and people working in agriculture seem to largely influence how pictures and practices are perceived and evaluated. Different judgements about the same issues are then leading to a lack of mutual understanding of opinions, motivations, and actions.

Implications of Picture Perception on Public Communication

The use of pictures of livestock farming when communicating with the public does increase transparency and many people appreciate this approach. Pictures give people a better impression and understanding of how livestock farming looks like today and they have the power to reduce the gap between public perceptions of farming and farming realities. Nevertheless, what pictures do not automatically do is to increase acceptance, especially for already contentious husbandry systems and practices. It rather looks as though pictures from livestock farming sometimes even achieve the opposite: they endorse peoples’ already existing concerns by showing them realities that are contrasting the values and beliefs they hold. Realistic images can further activate lay-theories about factory farming.

What to do? Pictures and videos are useful tools to provide information and communicate with people if the aim of using pictures rather is starting a discussion than reaching acceptance. At least in Germany and some other Western European countries, presenting realistic pictures is not a successful approach to increase public support for common indoor housing systems.

However, if pictures are used in communication, it is worthwhile to keep in mind that the way pictures are taken and how systems and animals are depicted on these pictures (and also in videos) influences the overall perception, especially by people not familiar with the seen. The effects of pictures are very dependent on comparably small variations in picture composition. Such variations might not even be obvious to people familiar with the topic. Different existing frames and mental models within people’s minds that are unconsciously used to organize new information might lead to different perceptions of pictures and also possibly to a somehow incorrect remembrance of picture details. Predicting a picture effect on the audience from within the sector can therefore be a challenge in strategic communication including pictures.

Implications of Picture Perceptions for the Design of Husbandry Systems

Analyzing picture perception of husbandry systems within the public can give valuable insights into the core critiques regarding the systems and, therefore, also for designing a future-oriented livestock sector with higher public acceptance. Pictures of common systems, such as floor husbandry for broilers, fully slatted floor for fattening pigs, or farrowing crates for sows, are evaluated very negatively by the public (Busch et al., 2015; Gauly et al., 2017; Sonntag et al., 2017). Little space and

Figure 4. Lay theory for explaining the relationships between factory farming and unhealthy meat. Source: Author presentation based on results by Sonntag et al. (2018a).
“factory farming” are closely connected to such pictures in peoples’ minds.

In contrast, contact to outdoor areas improves the perceptions of husbandry systems dramatically. Naturalness and outdoor access in husbandry systems act as key stimuli for judging the appropriateness of a system by lay people. Although many experts in animal husbandry will argue that a lack of outdoor access is not the most important issue in the welfare debate, and it is further connected with other challenges such as increased parasite infections, hygienic problems, emissions, and higher costs, it plays a major role in the public agenda. We therefore argue that positioning the sector as welfare leader that produces high-quality products should keep images of “natural light and fresh air” in mind. Achieving corporate social responsibility while ignoring public demand for naturalness, including some forms of outdoor access, will be a hard road to follow.

The challenge and dilemma of this situation sharpen when looking at the practicability of providing outdoor access for the most common species. Keeping pigs and poultry in outdoor housing while maintaining animal numbers on the same level, for example in Germany, would be impossible due to a lack of land availability and emissions. Animal numbers would have to be drastically reduced.

The situation for dairy cattle is a bit more relaxed because there are still a notable number of farms that provide pasture access for lactating dairy cows, especially in North-Western Germany. Nevertheless, numbers of pasturing dairy cows are declining as well. For some dairy farms, providing pasture access seems to be impossible. This includes, for example, large farms in Eastern Germany but also small-size farms in Southern Germany. Initiatives that are trying to maintain the status quo of pasturing for dairy cows are emerging (e.g., Stichting Weidegag in the Netherlands) and demonstrate that the value of outdoor access is recognized by parts of the sector as an important communication tool. Furthermore, solutions for dairy cattle are easier to implement compared with pigs and poultry. Non-pasture outdoor access is, at least for cows already housed in cubicle barns, a feasible hybrid strategy also including choice for the animal.

For pigs and poultry, the situation would be harder to change. A compromise in order to signalize efforts to improve welfare to the public could be indoor systems with an outdoor access such as winter gardens or concrete outlets.

Using a marketing-oriented approach in which supply chains start thinking the chain with customer preferences could foster new types of innovation in husbandry systems. Currently, there are some initiatives that integrate public perceptions into barn design such as the so-called cow garden barns in the Netherlands (www.koeientuin.nl), or the KTBL idea contest for architecture students in Germany about the future design of barns (www.ktbl.de). A stable for laying hens in the Netherlands has been designed together with consumers and scientists (www.rondeelieren.nl) and breaks with traditional barn architecture. Such concepts may not (yet?) be implementable for a whole sector but, nevertheless, they show how innovation, including various disciplines and perspectives, may be successful and initiate a debate. In the marketing literature, such types of innovation management are discussed under the term “open innovation,” integrating customers as well as lead users (innovative farmers) and stakeholders.

Livestock farming needs to bridge the gap between societies’ expectations and farming realities. In a two-directional debate between the sector and the public, chances for building a sustainable and economically viable sector are promising. Simultaneously, research about animals’ preferences and effects of publicly demanded aspects such as outdoor access need to be strengthened in order to judge and find innovative solutions. How politics and the retail business react when public pressure becomes too heavy remains uncertain. However, the developments in the debates surrounding battery cages have demonstrated that if a system is not able to convince people and shocking images underline this perception, there is a high probability of being abandoned by law and/or by powerful buyers such as large retailers. Acknowledging concerns of lay-peoples is a key factor leading to a more customer-oriented livestock sector.

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