Perception and Evaluation of a Pig Fattening Pen Based on Film Material in an Online Survey Experiment with German Citizens

Anna Wernsmann and Christiane Wildraut
Fachhochschule Südwestfalen, Soest

Marie von Meyer-Höfer
Georg-August-Universität Göttingen

Marcus Mergenthaler
Fachhochschule Südwestfalen, Soest

Abstract

As many parts of today's society have only few direct connections to farming, an increasing alienation of the population from agriculture is noticed in Germany. Especially pig farming is criticised due to a discrepancy between farmers' and citizens' perception of animal welfare in modern livestock farming. With regard to the increasing use of the internet, social media, picture and film materials have become essential in communication about livestock production. In this context, it is important to deal with the effects of pictures and videos on citizens' perception and evaluation. In general, the perception of videos is affected by the viewers' characteristics. Apart from that, the perception of videos is affected by picture design and picture elements. The aim of the present study is to analyse people's perceptions and evaluations of film material showing a pig fattening pen. For this purpose, 464 participants were randomly shown four out of sixteen videos in an online experiment. The videos varied according to housing conditions (e.g. weight of the pigs, stocking density) and recording conditions (e.g. camera angle, lighting conditions). A cluster analysis based on belief in animal mind, interest and knowledge about pig farming and meat consumption was conducted. Subsequently, the identified segments, the different housing conditions and the recording conditions of the videos were used as independent variables to perform an analysis of variance with the evaluations of the videos as dependent variable.

The results show that the identified clusters significantly differ in the evaluations of the videos. Furthermore, housing conditions have a higher impact than recording conditions. The results indicate that high stocking densities lead to negative evaluations. It can be assumed that respondents do not recognise minor differences in film material. In general the videos were rated poorly. This implies for PR that improving recording conditions of the videos might not lead to a better evaluation of livestock farming than improving housing conditions. Different information requirements in different clusters should be considered in agricultural PR.

Key Words

perception; evaluation; videos; pig fattening pen; cluster analysis; public relation; quantitative survey

1 Introduction

Today's agriculture is subject to pressure from international competition due to world market forces as well as increasing expectations from society. Media tends to depict agricultural production in either a positive romanticised or a negative scandalous way, which causes tensions and can explain the increasing criticism of intensive agriculture (ALBERSMEIER and SPILLER, 2009). Hence, parts of society can hardly imagine agriculture as a modern economic sector (KÖCHER, 2009). Consequently, an increasing alienation of the population from agriculture can be noticed in Germany (WILDRAUT et al., 2015). The criticism is often targeting livestock farming, whereby pig farming is mostly criticised (SONNTAG et al., 2016).

Stakeholders have different perceptions of livestock farming, which evokes growing concerns and an increasing criticism (DUIJVESTEIJN et al., 2014). However, it should be considered that there also are differences within the stakeholder groups. Studies indicated that i.a. knowledge (WEIBLE et al., 2016), interest (EUROPEAN COMMISSION, 2007) and ethical principles (SPILLER et al., 2015) might influence citizens' perception and evaluation of modern livestock farming. Further research indicates that an avoidance of meat consumption can be linked to the evaluation of animal husbandry (SANTOS and BOOTH, 1996).

In order to improve the image of animal husbandry, farmers, agribusinesses and farmers' associations are using PR tools. The internet, social media channels, blogs and video platforms have become an important communication tool where images and videos of animal husbandry are shared. However, the effect of pictures and videos showing modern animal husbandry is insufficiently investigated. Until today only a few scientists have dealt with this particular issue. Initial studies show that both the image elements (e.g. animals and animals' size) and the composition (e.g. lighting conditions, camera angle) might influence the citizens' evaluation of pictures showing animal husbandry (BUSCH et al., 2015a; BUSCH et al., 2015b; WILDRAUT et al., 2015). This paper describes the viewers' characteristics as well as image elements and compositions which might influence citizens' evaluation of videos showing modern livestock farming.

The present study transfers assumptions of previous studies into own video recordings. In this context, short videos show a fattening pig pen. The videos varied according to weight of the pigs, the stocking density, different camera angles and lighting conditions. It was analysed whether these aspects have an influence on the evaluation of the videos or not. As already mentioned, the characteristics of the viewer might influence the evaluation of the video showing modern animal husbandry. The aim of the study is to take these aspects into account and to analyse the effect on citizens' perception and evaluation. Furthermore, possible consequences for PR and in particular for the use of video material were derived. The results of the study might be interesting for agricultural managers and farmers' associations to target special groups of citizens' and specify agricultural PR.

2 Current Criticism of Modern Livestock Farming

Livestock farming is under pressure from economic efficiency and societal concerns. Especially animal welfare is at the centre of debate. The reasons for this are different perceptions and understandings of animal welfare by the key actors. In this context the stakeholders are i.a. farmers, researchers, food industry, non-governmental organisations (NGOs), citizens and public authorities. Several studies deal with the different stakeholders' views (VERBEKE, 2009).

DUIJVESTEIJN et al. (2014) asked urban citizens, animal scientists and pig farmers to observe the behaviour of chosen pigs. The results indicate that pig farmers evaluate the behaviour of the shown pigs in a more positive way than animal scientists and urban citizens do. A study of VANHONACKER et al. (2008) in which farmers and citizens ranked animal welfare aspects, indicate similar results. Compared to the farmers' ranking, citizens attributed a higher importance to most aspects (e.g. stocking density, air quality, available space and daylight). Furthermore, citizens evaluated the status quo of animal welfare in modern animal husbandry more negative than farmers did. Nevertheless, it should be considered that farmers also take economic aspects into account when evaluating animal welfare (BOCK and VAN HUIK, 2007).

A closer look at the citizens' criteria shows that animal care and animal health, especially the absence of pain, suffering and frustration are important evaluation criteria. Nevertheless, a study of LASSEN et al. (2006) indicates that the absence of pain is a mere insufficient criterion for citizens, which is assumed to be fulfilled. The most important factor for citizens is the pigs' ability to engage natural behaviour (DUIJVESTEIJN et al., 2014; LASSEN et al., 2006; VANHONACKER et al., 2008; WILDRAUT et al., 2015). In relation to specific housing conditions, frequently named criteria were outdoor access and space to move (HEISE and THEUVSEN, 2016b; VANHONACKER et al., 2008; SATO et al., 2017). VANHONACKER et al. (2009) indicate that the stocking density and pen size are major aspects concerning the mentioned space to move. To achieve a more positive public perception, the pen size needs to be increased (VANHONACKER et al., 2009). Apart from these aspects, studies indicate that further criteria, such as air quality and daylight conditions were also used to evaluate animal welfare conditions (SONNTAG et al., 2016; WILDRAUT et al., 2016).

In general, the citizens' imagination of animal husbandry is comprehensive. Studies have shown that not only animal-related, but also resource-related criteria are used to evaluate animal husbandry (HEISE and THEUVSEN, 2016b; VANHONACKER et al., 2010). In a study of SATO et al. (2017), American residents were asked what they consider to be an ideal pig farm. Apart from animal-related criteria, respondents also stated characteristics, such as profitability, farm cleanliness and sanitary as well as farm workers' rights. According to BOOGAARD et al. (2010) citizens look at livestock farming from three angles: modernity, tradition and naturality. Citizens desire modern farms which are at the same time traditional and natural. During farm visits citizens' perception developed to a more

pluralistic, complex and flexible one (BOOGAARD et al., 2010).

3 Factors Associated with People's Perception of Livestock Farming

There exist growing concerns and increasing criticism due to a different frame of reference of farmers and citizens (BENARD and DE COCK BUNING, 2013; DUIJVESTEIJN et al., 2014; TE VELDE et al., 2002). According to TE VELDE et al. (2001) citizens' frame of reference is influenced by convictions, values and norms as well as knowledge and interest. Because of different perceptions, there is no consensus between farmers and citizens and there can be found only a few shared values. Hereinafter various factors that might influence the citizens' frame of reference will be presented.

In several studies the perception and evaluation of animal welfare is associated with people's involvement in agriculture, especially in livestock farming. In their study, WOLF et al. (2016) discovered that more than 60 % of the respondents are concerned with animal welfare in dairy cattle, while 20 % described themselves as not to be concerned. Another survey has revealed that 58 % of EU-Citizens want to be better informed about animal production. The authors summarise that people's interest in receiving more information is linked to the importance citizens attach to the issue (EUROPEAN COMMISSION, 2007). Overall, the interest in agricultural production has increased (KANTAR EMNID, 2017). According to KANTAR EMNID (2017), this concerns in particular older persons. In regard to laying hens' welfare standards VECCHIO and ANNUNZIATA (2012) indicate that interested persons are more often critical towards animal welfare in modern livestock farming. Thus, well-informed persons tend to be more critical towards animal husbandry than less-informed persons (BUSCH et al., 2013). The reason for this may be the fact that interested citizens ask for information and therefore have better knowledge. Overall, people describe themselves as uninformed. More than 70 % of all respondents in a German survey stated that they have little or no knowledge of agriculture (FORUM MODERNE LANDWIRTSCHAFT, 2016). A European study demonstrates similar results. Throughout the EU 28 % of the citizens surveyed stated to have no knowledge and 57 % only have little knowledge of housing conditions in modern livestock farming (EUROPEAN COMMISSION, 2007). According to a cluster analysis of WEIBLE et al. (2016), people who have a better knowledge of agriculture were significantly more often 'opponents' of modern pig production. In contrast, 'tolerant' and 'moderate' segmentations of citizens know much less than the 'opponents'. Therefore, authors conclude that a better knowledge will not lead to a better perception and evaluation of modern livestock farming (WEIBLE et al., 2016).

A further explanation, why citizens evaluate animal welfare in different ways could be that people's demands concerning animal welfare are ethically motivated (SPILLER et al., 2015). HILLS (1995) used in a survey four statements to determine the respondents' belief in animal mind. In this context four questions concerning mammals' ability to feel emotions and to act consciously were asked. The results indicate that animal rights advocates have a strong belief in animal mind, while farmers' and citizens' belief in animal mind tend to be less strong. Furthermore, the results also show that empathy for animals and belief in animal mind is correlated (HILLS, 1995). According to SPILLER et al. (2015) this is due to the change of values relating to human-animal-relationship and personal experience with pet animals.

Meat avoidance can be ethically motivated and can be linked to ethical concerns. A study of CORDTS et al. (2013) indicates that meat consumption affects the attitudes towards animal welfare. Therefore, vegetarians and respondents with low meat consumption are much more critical of animal husbandry. Respondents with the lowest meat consumption rated current housing conditions more negatively (SCHULZE et al., 2007). De BACKER and HUDDERS (2015) also indicate that people's concern about animal welfare might reduce their meat consumption, while a study of LATVALA et al. (2012) shows that the intention to reduce the own meat consumption is primarily because of personal health and weight reduction, followed by animal welfare and environmental considerations. Those who already avoid eating meat, mentioned ethical principles and dislike of meat more often than partial meat avoiders (SANTOS and BOOTH, 1996). According to DE BOER et al. (2017) vegetarians stated taste and animal welfare related reasons more often than high-meat-consumers. Furthermore, meat consumption is also linked to the importance citizens attach to animal welfare.

4 Agricultural Public Relations and the Effect of Images

As mentioned in Chapter 3, an increasing criticism towards livestock farming can be observed. To enhance the society's acceptance, public relations (PR) tools and techniques are needed. According to a study of KANTAR EMNID (2017), 60 % of the respondents receive information about agricultural production through direct conversations with farmers or purchases in farmer's markets. Another study indicates that direct contacts might contribute to a better understanding and more positive image of agriculture since one's own personal experience might lead to a better image (KÖCHER, 2009). Besides, direct communication between farmers and consumers might increase the mutual understanding (ROVERS et al., 2017). In a study of ERMANN et al. (2017) respondents were asked about animal welfare before and after visiting a pig farm. After the farm visits, respondents valued animal welfare in the shown pig barns better than before. According to BOOGAARD et al. (2010) citizens' perception seems to be more pluralistic after visiting a farm. ERMANN et al. (2017) conclude that farm visits are a good manner to increase acceptance.

As in particular the urban population usually has only little to no direct connection to farmers, other sources of information have become more important (FORUM MODERNE LANDWIRTSCHAFT, 2016). Overall, in an American study by WOLF et al. (2016) 70% of all respondents stated that they have not seen any media stories dealing with animal welfare in dairy cattle. Those who have seen media stories watched these on television or on the internet. A survey of KANTAR EMNID (2017) shows that daily contributions in the newspapers and on television are the most important media concerning agricultural topics. Two thirds of the respondents stated they would use the mass media (KANTAR EMNID, 2017). In 2007, an EU-wide study also reveals that most citizens use television, internet and daily newspaper to receive information about housing conditions (EUROPEAN COMMISSION, 2007). Over the last ten years the importance of the daily newspapers and magazines has decreased, while the use of the internet has strongly increased (KANTAR EMNID, 2017). In particular, younger respondents mainly receive information about agricultural topics via the internet, while daily newspapers seem to be more important amongst the older citizens (EUROPEAN COMMISSION, 2007; KANTAR EMNID, 2017).

According to VAN WOERKUM and AAARTS (2009) 'modern life takes place on the screen'. Thus, the increasing use of the internet shows that picture communication is already well established (BUSCH et al., 2015a). The internet offers a wide range of possibilities to publish and share images and videos. In Germany, several initiatives in agricultural PR use different formats. To give a few examples, the videoblogger Dirk Nienhaus ("Bocholter Landschwein") provides insights in the daily work of a pig farmer. The blogger Marcus Holtkötter ("BauerHolti") and Nadine Henke ("Brokser Sauen") inform about current issues on Twitter and Facebook. Blogs are becoming more and more popular. ZERFASS and TENCH (2012) describe weblogs as an important communication tool which provides several opportunities in social media communication. Furthermore, a study indicated that blogs are described by readers as a credible source of information (JOHNSON and KAYE, 2004). A further example of an agricultural PR-initiative is a webcam which shows permanently two farrowing pens in a pig farm of Werner Schwarz (vice president of the German Farmers' federation). To show authentic videos, automatic cameras are used while manned cameras seem to represent a subjective point of view. Webcams are becoming increasingly popular and are an important product of the internet (VAN WOERKUM and AARTS, 2009). In summary, according to ZERFASS and TENCH (2012) online videos have a high potential and they are an important communication tool in PR.

Due to the increasing use of the modern media (i.e. the internet), it is important to deal with the effects of pictures and videos on citizens' perception and evaluation. In order to understand the effects, the process of perception should be considered in detail. The process of perception consists of the reception and selection, relegation and processing of external stimuli (HARTUNG and SCHERMER, 2010). Due to this process, perception is always subjective. As both images and videos appeal to visual senses, the following section explains the impact of both.

According to KROEBER-RIEL et al. (2011), images can be perceived and processed faster and more easily than other external stimuli. Pictures are also easier to remember and they are more credible (GRABER, 1996). PAIVIO and CSAPO (1973) explain that processing of pictures and verbal information is carried out in two different codes: picture and verbal code. Information is better remembered when it is stored in verbal and picture codes. In addition, pic-

tures are easier to translate into verbal information than vice versa. Compared to verbal communication, this effect is described as a 'picture-superiority' (CHILDERS and HOUSTON, 1984; PAIVIO and CSAPO, 1973). Furthermore, images have an effect on emotionality (LOBINGER 2012). Especially pictures showing animals can evoke emotions (BOSCH, 2007). Videos have similar effects on the viewer. However, videos address both auditive and visual senses. They function as an eye-catcher and attract attention (WIRTH, 2002; NIEGEMANN et al., 2008). Compared to images, the information offered can be presented differently (TVERSKY et al., 2002). Furthermore, videos have a high density of information, which, however, can also lead to an overload of information. In addition, videos seem to be authentic and realistic and they can evoke emotions (PLAG and RIEMPP, 2007). To give an example, in agricultural PR webcams are used to present an authentic image of modern animal husbandry. Studies indicated that webcams might increase transparency, but they won't lead to a better understanding of modern livestock farming (MÖSTL and HAMM, 2016; GAULY et al., 2017).

In general, the effect of pictures as well as of videos depends on the setting and composition of picture elements. Besides, activating stimuli leads to a longer fixation. The activation potential is linked to the size, colour, design and contrast of the pictures (KROEBER-RIEL et al., 2011). Concerning livestock farming, the perception of images and especially of videos has not been investigated sufficiently. But this aspect is becoming increasingly important. Therefore, initial results will be presented. A study of TIPLADY et al. (2015) shows film material with animal cruelty in cattle transports for slaughter to Australian residents. After 12 months the respondents were reinterviewed. The results indicated that the film material was remembered and led to strong emotions even after 12 months. The researchers conclude that these footages have long term memories.

Further research results indicate that people focussed on the faces and bodies of the pigs first, while the housing equipment was not noticed directly. One study, for example used the eye-tracking-method to analyse eye movements (BUSCH et al., 2015a). A further study shows the tendency of a better rating of pictures showing day-old-broiler than pictures with older ones (BUSCH et al., 2015b). Despite these results, housing equipment and stocking density are also important criteria for evaluation of housing conditions. In a study of BUSCH et al. (2015b), pictures of broiler fattening barn with varying stocking densities were shown to people from the general public. The study shows that only a strong reduction of stocking density can lead to a better rating.

According to a study of WILDRAUT et al. (2015), the perception of livestock farming also depends on the way of representation. The study shows that people's perception of videos displaying livestock farming might be influenced by camera work and lighting conditions. A further study shows that the camera position might influence the perception and evaluation as well. Pictures which were taken in higher positions (bird's-eye view) tend to be rated more positively (BUSCH et al., 2015a). Other studies demonstrate that the display of animal faces leads to more positive ratings (WOLFRAM et al., 2016). In conclusion, studies have shown that the perception and evaluation of animal husbandry depends on many factors.

Overall, the literature review demonstrates that the effects of images and videos showing modern animal husbandry have not been investigated sufficiently and only a few studies focus on this specific topic. As these studies show that the image objects themselves (e.g. animals' age and stocking density) and the recording conditions (e.g. light conditions, camera angle) might influence the evaluation, this aspect should be analysed in more detail.

5 Methodology

5.1 Structure and Implementation of the Survey

In the present study 464 participants from Germany were surveyed based on a standardised online questionnaire with 25 items (average reply time 10 min). The collection of data took place in July and August 2016. The questionnaire was composed of five main subjects. In the first part of the survey sociodemographic data, such as gender, age, education, monthly net income, household size and place of residence were collected. The second part was to gain insights into the participants' contact to pig farming and included the subjective self-assessments of interest and knowledge about pig production. These aspects were surveyed via an analogue scale from 1 (extremely low) to 100 (particularly high) (only the ends of the scale were labelled).

In the next step the belief in an animal's mind was inquired. In this context four items, concerning animals' ability to feel emotions and to act consciously were scored on a five-point Likert scale. The statements concerning animal mind and animal feelings

were inspired by HILLS (1995). In order to determine the belief in animal mind, the statement that pigs react automatically, guided by instincts and that they do not know what they are doing and the statement that pigs' feelings tend to be less intense than human emotions were rescaled. Furthermore, the mean value of the four statements was calculated. In a fourth step, participants were asked about their consumption of meat. This background data was collected to get a better understanding of the respondents' socio-demographic and attitudinal background.

The collection of data regarding participants' perception and evaluation of film material of a pig fattening pen constituted the main part of the survey. Within the survey, each participant was shown four randomly chosen videos out of sixteen in an experimental setting. The videos were made in February 2015 and April 2015 in an interval of 10 weeks. Furthermore, the videos were taken in the morning between two feeding times. All videos show the same pen of a typical pig fattening farm in North Rhine-Westphalia, Germany. The pigs were kept in a pen with a basic dimension of 2.2 m x 4.1 m, fully slatted floor and liquid feeding system. As presented in Table 1, the videos just varied according to housing conditions, such as weight of the pigs (65 or 100 kg) and stocking density (8, 10, or 12 pigs per pen). In regard to the basic dimension of the pen, the stocking density of 12 pigs is the maximum number of pigs legally allowed. Additionally, the videos varied according to recording conditions, such as lighting conditions (natural or artificial light) and camera angle (steep, 160 cm or low, 120 cm). The 16 variants of the videos and the varying factors are given in Table 1.

The length of the videos was 25 sec. The video edit was not affected by pigs' behaviour, but interfering noise was removed. Screenshots of the 16 videos can be seen in Figure A1 in the appendix.

In order to determine the participants' perception and evaluation of the shown videos, three questions were formulated. The questions were based on the model of KATZ and STOTLAND (1959) in which attitudes have a cognitive, affective and intentional component. The first question aimed at the affective component. Therefore, the respondents were asked whether they like the shown housing conditions in the pig fattening pen or not. The second question was based on the cognitive component. The participants were asked whether optimal housing conditions for pigs are given or not. Finally, they were asked whether they would accept the shown housing conditions in the future or not. The last question was derived from the behavioural component. The evaluation of the shown film material was tested via analogue scales from 1 (strongly disagree) to 100 (strongly agree).

5.2 Data Analysis

The data were analysed using IBM SPSS Statistics 21. The analysis of the evaluation of the videos was conducted using descriptive statistics. Therefore, the Pearson correlation coefficient among the questions concerning the evaluation of the videos was computed. Subsequently, the mean values of these results were calculated. Apart from descriptive statistics a

Table 1. Video variants in consideration of the varying factors: stocking density, weight of pigs, lighting conditions and camera angle

Variants	Weight of pigs	Stocking density	Lighting conditions	Camera angle
V1	65	8	artificial	low
V2	65	8	artificial	steep
V3	65	10	artificial	low
V4	65	10	artificial	steep
V5	65	12	artificial	low
V6	65	12	artificial	steep
V7	65	12	natural	low
V8	65	12	natural	steep
V9	100	8	artificial	low
V10	100	8	artificial	steep
V11	100	10	artificial	low
V12	100	10	artificial	steep
V13	100	12	artificial	low
V14	100	12	artificial	steep
V15	100	12	natural	low
V16	100	12	natural	steep

Source: own data (2016)

cluster analysis was conducted. For this purpose variables which are assumed to be associated with the perception and evaluation of pig production were identified. As described in Chapter 3, the following variables might influence people's evaluation of modern animal husbandry: belief in animal mind, meat consumption (both coded as 'dummy-variables') and interest and knowledge of pig farming (captured on an analogue scale, continuous variables). Therefore, these variables were used to run a cluster analysis. The cluster analysis was performed using a two-step cluster method. The particular advantages of a two-step cluster analysis are the simple handling of large samples and managing both continuous and categorical variables (SCHENDERA, 2010). As the name suggests, the cluster analysis includes two steps. The first step is a pre-clustering in which the size of the data matrix is reduced. In the second step these pre-clusters are aggregated by a hierarchical method (SCHENDERA, 2010). As continuous and categorical variables were used to run the analysis, the log-likelihood was required. Based on the Bayesian information criterion, the best number of clusters was determined. In total, 13 outliers have been removed. The derived clusters were used to identify groups of persons and to determine differences concerning the evaluation of the shown film material. For a further description, other variables were compared based on the cluster assignment. The data was analysed by univariate ANOVA and post hoc Games-Howell tests were carried out. Post-hoc Games-Howell was chosen because variances differ and size of clusters are unequal (FIELD, 2009).

The differences between these clusters taking into account the varying housing conditions and recording conditions were compared by using a univariate General Linear Model. In this analysis the clusters and the four varying factors in the videos (weight of pigs, stockings density, camera angle and lighting conditions) were included as principal, fixed effects. Subsequently, post hoc GT2 Hochberg-tests were carried out. In Table 2 the study design and implementation is presented in a short and compact way.

5.3 Sample Description

The sample recruitment was realised through a professional panel provider and the survey was implemented throughout Germany. The number of respondents was limited by adding a quota. Quota for gender, age and education were adapted to the national average. Due to a modification of quota during data collection and removal of outliers the final sample is slightly biased towards younger and better educated persons.

Table 2. Study design and implementation in a compact way

Creating of videos	• 16 videos were made in total. • Videos varied according to stocking density, weight of pigs, camera angle, lighting conditions.
Online survey	• Each participant was shown randomly four out of 16 videos. • Evaluation of videos: on each video there were asked three questions. – Do you like the shown housing conditions in the pig fattening pen? – Are optimal housing conditions for pigs given? – Would you accept the shown housing conditions in the future?
Data preparation	• Evaluation of the videos: – Pearson correlation coefficient between these three questions was conducted. – Mean values were calculated. • Descriptive analysis of sociodemographic data, meat consumption, etc.
Cluster analysis	• Two-step Cluster analysis was conducted. • Belief in animal mind, meat consumption and interest and knowledge of pig farming were used to run the analysis.
ANOVA 1	• Analysis of variance (ANOVA) was conducted to determine differences between the clusters and cluster forming variables (e.g. interest and knowledge) and background data (e.g. frequency of farm visits). – dependent variable: cluster forming variables – independent variables: cluster assignment
ANOVA 2	• A second ANOVA was conducted to determine differences between the evaluation of the 16 videos. – dependent variable: evaluation of the videos – independent variables: number of videos
General Linear Model	• Subsequent analysis of variance was conducted by using a General Linear Model. – dependent variable: evaluation of videos – independent variables: varying factors of the shown videos and clusters of participants

Source: own data (2017)

Table 3. Sociodemographic characteristics of the sample compared with the German national average

Variables		Sample (2016)	National average (Zensus 2011)
Gender[1]	Female	50.4 %	51.2 %
	Male	49.6 %	48.8 %
Age[2]	18-29	18.1 %	14.1 %
	30-39	19.0 %	11.7 %
	40-49	22.0 %	16.6 %
	50-59	25.0 %	14.4 %
	>60	15.9 %	26.5 %
Education[3]	No school qualification	0.6 %	4.7 %
	Still in school	0.2 %	2.5 %
	Lower secondary school leaving certificate	24.1 %	35.6 %
	Intermediate school leaving certificate	39.4 %	28.9 %
	Entrance qualification for studies at 'University of Applied Sciences'	12.3 %	8.0 %
	General or subject-restricted higher education entrance qualification	23.3 %	20.4 %
Monthly net income/person	<1,000 €	7.5 %	-
	1,001-2,000 €	31.9 %	-
	2,001-3,000 €	32.5 %	-
	3,001-4,000 €	18.1 %	-
	>4,001 €	9.9 %	-
Household size[4]	1 person	20.3 %	17.1 %
	2 persons	45.5 %	31.1 %
	3 persons	17.5 %	20.1 %
	4 persons	13.4 %	19.4 %
	>5 persons	3.4 %	12.3 %
Population density[5]	Population density of respondents' residence (people per km²)	1,275	231

Source (national average): [1]STATISTISCHES BUNDESAMT (2014a), [2]STATISTISCHES BUNDESAMT (2014b), [3]STATISTISCHES BUNDESAMT (2014c), [4]STATISTISCHES BUNDESAMT (2014d), [5]STATISTISCHES BUNDESAMT (2015), [5]STATISTISCHES BUNDESAMT (2016)
Source (sample): own calculation (2017)

Half of the participants are female. All interviewed persons are over 18 years old and 40 % of them are between 50 and 59 years old. As shown in Table 3, the respondents are younger than the German national average. Besides, the majority of the participants have middle or high level education. In comparison with the national average the level of education is higher. In addition, they live in smaller households than the national average. Most of the interviewed persons live in a one- or two-persons-household. Two thirds of the participants earn more than € 1,000 and less than € 3,000 monthly.

Furthermore, respondents live in regions with a high population density. Compared to the national average, participants live in very urban regions.

6 Results

6.1 Descriptive Analysis

Most of the respondents have no agricultural background. 40 % have never been and 52 % have rarely or occasionally been on a pig farm (Table 4). Those who have visited a pig farm have friends (30 %), relatives (21 %), or neighbours (21 %) living on a farm. Besides, 48 % of those stated that they know farms through on-farm tourism and farm shops (multiple responses were possible). The subjective self-assessment of knowledge about pig farming on a scale of 1 to 100 is at an average of 30.0±26.1. This is contrasted by the subjective interest in farming. The participants rated their interest in pig farming at an aver-

Table 4. Percentage frequencies of farm visits and meat consumption

Frequency of farm visits	never	43.2 %
	rarely	34.0 %
	occasionally	18.2 %
	often	3.6 %
	regularly	1.0 %
Meat consumption	never	5.6 %
	exceptionally	2.6 %
	once a week	9.7 %
	more than once a week	54.5 %
	once a day	22.2 %
	more than once a day	5.4 %

Source: own calculation (2017)

age of 41.9±29.5.

Overall, 6 % of the participants are vegetarians, 12 % eat meat once a week or less, 54 % several times a week and 28 % at least once a day or more. The meat consumption varies between the genders. Women stated that they eat less meat. This is a statistically significant result ($\bar{x}$ women=3.8, $\bar{x}$ men=4.2, t(462)=3.70, p=0.001). According to the respondents, meat is primarily purchased in supermarkets (69 %), butcheries (58 %) and in discounters (39 %). Some stated that they would buy meat on a farmers' market (11 %) and in organic stores (4 %) (multiple responses were possible).

The analysis of the belief in animal mind presents controversial results. The evaluation of the first statements concerning pigs' conscious acting shows that the respondents tend to agree, but there are also a high percentage of respondents who are uncertain. As shown in Table 5, 40 % of the participants agree to the second item. This statement concerns the instinctive reaction of pigs. Compared to the first items, the pigs' ability is noticeably limited. The third statement with regard to the feelings of pigs shows a clear approval. More than 85 % of respondents agreed. Besides, the calculation of mean rank and standard deviation validates this result. The fourth statement reveals the greatest uncertainty: 45 % of participants are unsure about pigs' feelings intensity. More than one third of the respondents tend to disagreement indicating a belief in high intensity of feelings.

6.2 Cluster Analysis

The conducted two-step cluster analysis allows the identification of four clusters. As shown in Table 6, these clusters comprise between 64 and 181 respondents. For a further description other characteristics, such as sociodemographic data was compared based on the cluster assignment. With regard to sociodemographic data there are no significant differences between the four clusters.

Cluster 1 – uninvolved:

Two thirds of the participants from Cluster 1 (n=64) have never been on pig farms. Thus, this cluster has a significantly lower frequency of farm visits than the other clusters. Furthermore, the cluster is characterised by its lowest interest and knowledge about pig farming. The subjective self-assessment is significantly lower than the evaluation of the other clusters (interest $\bar{x}$=31±28, knowledge $\bar{x}$=20±21). There is no difference with regard to meat consumption in comparison to the other clusters. The analysis of the belief in animal mind shows uncertainty. The results indicate a tendency that Cluster 1 has the highest proportion of male respondents. In total, men made up 59 % of Cluster 1. In the following, Cluster 1 is described as uninvolved.

Cluster 2 – moderate:

In contrast to Cluster 1, contact to pig farming is little higher in Cluster 2 (n=115). More than half of the participants from Cluster 2 have been rarely or occasionally on a pig farm. Besides, the subjective self-assessment of interest and knowledge is higher than in Cluster 1, but lower than in Cluster 3 and 4 (interest $\bar{x}$=39±28, knowledge $\bar{x}$=29±25). The analysis of belief in animal mind reveals that they attributed the ability to feel emotions and to act consciously to pigs. The data show many similarities with Cluster 3. Differences compared to Cluster 3 arise in the evaluation of negative statements in which pigs' feelings compared to humans was less intense. The analysis of responses indicates uncertainty. In the following, Cluster 2 is described as moderate.

Cluster 3 – ethical minded:

Cluster 3 is the largest one with 181 respondents. The participants are mostly interested in pig farming. They

Table 5. Percentage distribution of the level of agreement concerning four items about belief in animal mind, inspired by HILLS (1995)

Belief in animal mind	Strongly disagree	Rather disagree	I'm not sure	Rather agree	Strongly agree
Pigs have a consciousness and they are aware of what actually happens to them.	3.2 %	6.9 %	27.6 %	38.4 %	23.9 %
Pigs react automatically, guided by instincts. They do not know what they are doing.	6.3 %	19.2 %	34.7 %	31.3 %	8.6 %
Pigs are able to feel emotions, such as pain, suffering, fear, satisfaction and maternal affection.	0.2 %	0.2 %	9.1 %	33.8 %	56.7 %
Pigs' feelings tend to be less intense than human emotions.	15.5 %	22.4 %	45.7 %	14.0 %	2.4 %

Source: own calculation (2017)

Table 6. Cluster description with cluster forming variables and other characteristics

ANOVA	**Cluster 1** uninvolved	**Cluster 2** moderate	**Cluster 3** ethical minded	**Cluster 4** pragmatic	**total**
Size of cluster, absolute and in (%)	64 (14)	115 (24)	181 (38)	104 (22)	464 (100)
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
[1]interest in pig farming***	30.7^{a} *(27.8)*	38.7^{ac} *(28.0)*	46.9^{bc} *(30.1)*	43.6^{bc} *(29.4)*	41.9 *(29.5)*
[1]knowledge about farming**	20.3^{a} *(21.3)*	28.7^{ac} *(25.0)*	33.2^{bc} *(26.9)*	31.7^{bc} *(27.4)*	30.0 *(26.1)*
[2]frequency of farm visits (index)***	1.45^{a} *(0.69)*	1.83^{b} *(0.90)*	2.01^{b} *(0.95)*	2.01^{b} *(0.95)*	1.85 *(0.92)*
[3] Four statements concerning belief in animal mind:					
1. Pigs have a consciousness and they are aware of what actually happens to them.***	2.95^{a} *(0.33)*	4.23^{b} *(0.53)*	4.18^{b} *(0.92)*	2.88^{a} *(0.97)*	3.73 *(1.00)*
2. Pigs react automatically, guided by instincts. They do not know, what they are doing.***	3.03^{a} *(0.35)*	3.14^{a} *(0.86)*	2.68^{b} *(1.15)*	4.13^{c} *(0.48)*	3.17 *(1.04)*
3. Pigs are able to feel emotions, such as pain, suffering, fear, satisfaction and maternal affection.***	3.66^{a} *(0.76)*	4.50^{b} *(0.58)*	4.72^{c} *(0.55)*	4.48^{b} *(0.57)*	4.47 *(0.69)*
4. Pigs' feelings tend to be less intense than human emotions.***	3.06^{a} *(0.24)*	3.13^{a} *(0.41)*	1.75^{b} *(0.79)*	3.44^{c} *(0.77)*	2.65 *(0.98)*
[4]Belief in Animal Mind (mean value)***	3.13^{a} *(0.23)*	3.61^{b} *(0.33)*	4.12^{c} *(0.49)*	2.94^{d} *(0.35)*	3.59 *(0.62)*
[5]meat consumption index*	4.19^{ab} *(1.04)*	4.09^{ab} *(0.93)*	3.81^{a} *(1.21)*	4.16^{b} *(0.93)*	4.01 *(1.07)*
sociodemographic data:					
gender f/m (%) $^{n.s.}$	41/59	54/46	54/46	47/53	50/50
[6]age (index) $^{n.s.}$	3.08 *(1.41)*	3.01 *(1.35)*	3.03 *(1.30)*	2.97 *(1.39)*	3.02 *(1.34)*
[7]education (index) $^{n.s.}$	4.66 *(1.62)*	4.92 *(1.60)*	4.66 *(1.57)*	4.70 *(1.45)*	4.73 *(1.56)*
[8]monthly net income (index) $^{n.s.}$	2.75 *(1.01)*	3.02 *(1.03)*	2.91 *(1.14)*	2.88 *(1.14)*	2.91 *(1.01)*
[9]household size (index) $^{n.s.}$	2.30 *(1.02)*	2.28 *(1.00)*	2.36 *(1.11)*	2.41 *(1.05)*	2.34 *(1.05)*

Note**:** bold = cluster forming variables, significance level: *= p≤0.05, **= p≤0.01, ***= p≤0.001, $^{n.s.}$= not significant, small letters indicate significant differences between clusters (post-hoc test Games-Howell on the significance level p≤0.05); [1]1 = extremely low to 100 = particularly high; [2]scale from 1 = never to 5 = regularly; [3]belief in animal mind inspired by HILLS (1995): scale from 1 = totally disagree to 5 = totally agree; [4]Mean value of the four statements were calculated. For this purpose statement No. 2 and No. 4 were rescaled; [5]scale from 1 = I don't eat any meat to 6 = more than once a day; [6]scale from 1 = 18-29 years to 5 = >60 years; [7]scale from 1 = no school qualification to 7 = A-level; [8]index from 1 = <1,000€ to 5 = >4,000; [9]scale from 1 = 1 person to 5 = >5 persons

Source**:** own calculation (2017)

describe themselves as more informed (interest $\bar{x}$=47±30, knowledge $\bar{x}$=33±27). Moreover, nearly 30 % of Cluster 3 has rarely or more often been on a pig farm. Compared to the other clusters, the meat consumption of Cluster 3 tends to be lower. The analysis of belief in animal mind reveals that respondents have a strong belief in animal mind and in this context the highest mean value. With regard to awareness and feelings in their opinion animals are similar to humans. Cluster 3 attributes the ability to feel emotions and to act consciously to pigs and therefore strongly agree with statements concerning pigs 'ability to feel emotions and to act consciously, while they disagree that pigs are only guided by instincts and feel emotions less intense. In the following Cluster 3 is described as ethical minded.

Cluster 4 – pragmatic:

The subjective assessment of interest and knowledge can be compared to the evaluation of Cluster 3. The participants describe themselves as interested and well informed about pig farming (interest $\bar{x}$=44±29, knowledge $\bar{x}$=32±27). Compared to Cluster 3, the meat consumption tends to be higher. Besides, the analysis of belief in animal mind shows that respondents of Cluster 4 (n=104) agree to the statements concerning pigs' abilities to feel several feelings while they are unsure whether pigs are able to feel emotions less intensive than humans. Furthermore, they are unsure whether pigs act consciously, while they agree that pigs are guided by instincts. In summary, their beliefs in animal mind are limited and on a lower level than the belief in animal mind of Cluster 1, 2 and 3.

With regard to sociodemographic data the analysis indicates a tendency that Cluster 4 has a higher proportion of male respondents than Cluster 2 and 3. Hereafter, Cluster 4 is characterised as pragmatic.

6.3 Analysis of Variance (ANOVA)

Three questions were asked to determine the evaluation of the videos. The respondents were asked whether they like the shown housing conditions in the pig fattening pen, whether optimal housing conditions for pigs are given and whether they would accept the shown housing conditions in the future. The Pearson correlation coefficient was determined to check if the answers of the three questions correlate. The results indicate that the correlation coefficient is between r=0,899 and r=0,931, p=0,001. Therefore, the mean value of the answers to the three questions was computed to aggregate the evaluation of each video. In Table 7 mean values of the answers to each question are presented. Calculated mean values of the answers to the three questions (evaluation of the videos in total) are shown as well. The analysis of the mean value of the evaluation of 16 videos presents that the videos were generally rated on a scale of 1 (strongly disagree) to 100 (strongly agree) at an average of 18.78±21.99 (Table 7). It becomes clear that the highest average evaluation is 26.08±23.82 (Video 1) and the lowest average evaluation is 13.47±18.97 (Video 13). Therefore, differences between the videos become visible. The variance analysis (ANOVA) indi-

Table 7. Results of the evaluation of the sixteen video variants

Video	Characteristics of the videos	Sample size per video*	Do you like the shown housing conditions in the pig fattening pen?# *mean (SD)*	Are optimal housing conditions for pigs given?# *mean (SD)*	Would you accept the shown housing conditions in the future?# *mean (SD)*	Evaluation of videos in total[1] *mean (SD)*
V1	65 kg, 8 pigs, artificial light, low angle	133	29.11 *(25.68)*	25.18 *(24.70)*	23.95 *(24.73)*	26.08 *(23.82)*
V2	65 kg, 8 pigs, artificial light, steep angle	125	25.20 *(26.44)*	23.83 *(26.66)*	23.46 *(26.78)*	24.16 (*26.27*)
V3	65 kg, 10 pigs, artificial light, low angle	90	17.98 *(20.68)*	16.88 *(20.18)*	16.44 *(20.31)*	17.10 (*20.18*)
V4	65 kg, 10 pigs, artificial light, steep angle	106	20.75 *(27.36)*	19.32 *(27.77)*	19.37 *(28.62)*	19.81 (*27.36*)
V5	65 kg, 12 pigs, artificial light, low angle	105	20.53 *(22.33)*	18.72 *(22.07)*	18.70 *(23.23)*	19.32 (*22.08*)
V6	65 kg, 12 pigs, artificial light, steep angle	110	18.80 *(20.97)*	16.79 *(21.15)*	16.68 *(20.59)*	17.42 (*20.39*)
V7	65 kg, 12 pigs, natural light, low angle	106	15.98 *(20.45)*	14.79 *(19.92)*	15.68 *(21.55)*	15.48 (*20.45*)
V8	65 kg, 12 pigs, natural light, steep angle	113	25.57 *(21.95)*	20.50 *(21.29)*	20.80 *(23.45)*	22.29 (*21.18*)
V9	100 kg, 8 pigs, artificial light, low angle	111	25.06 *(24.92)*	23.05 *(24.43)*	22.58 *(24.96)*	23.56 (*24.46*)
V10	100 kg, 8 pigs, artificial light, steep angle	118	24.80 *(25.31)*	22.64 *(24.68)*	22.51 *(25.09)*	23.32 (*24.57*)
V11	100 kg, 10 pigs, artificial light, low angle	116	16.17 *(20.19)*	13.41 *(18.03)*	15.24 *(21.39)*	14.94 (*18.93*)
V12	100 kg, 10 pigs, artificial light, steep angle	129	17.81 *(19.23)*	15.43 *(17.85)*	15.13 *(18.43)*	16.12 (*18.06*)
V13	100 kg, 12 pigs, artificial light, low angle	129	13.97 *(19.65)*	13.19 *(18.63)*	13.26 *(20.01)*	13.47 *(18.96)*
V14	100 kg, 12 pigs, artificial light, steep angle	122	16.20 *(20.88)*	12.75 *(17.77)*	12.45 *(20.00)*	13.80 (*18.86*)
V15	100 kg, 12 pigs, natural light, low angle	131	15.73 *(19.18)*	13.98 *(17.57)*	13.62 *(18.95)*	14.44 (*17.94*)
V16	100 kg, 12 pigs, natural light, steep angle	112	19.47 *(21.20)*	18.63 *(21.25)*	18.80 (*22.63*)	18.97 (*21.37*)
total		1,856	20.23 *(22.78)*	18.07 *(21.98)*	18.03 *(22.90)*	18.78 *(21,99)*

*four videos per person at random
measured on a scale from 1 = strongly disagree to 100 = strongly agree
[1] mean values of the three questions were determined
Source: own calculation (2017)

cates significant differences between the shown film materials, F(15,1840)=4.328, p=0.001 but does not reveal which factors might influence the evaluation.

Table 8 shows the results of the univariate analysis of variance. The evaluation of the videos in total was the dependent variable (calculated mean values of the answers to the three questions). The cluster assignment and the varying factors of the videos (weight of pigs, stocking density, camera angle and lighting conditions), which might influence the evaluation of the videos, were used as independent variables. The differences between these factors were compared by using a General Linear Model. All factors were included as fixed effects. In the model, these factors were considered as main effect. In addition, interactions between the factors were also tested in the model. However, only the interactions that show significant differences will be presented below.

The results of the analysis show that the overall model is significant (F(63,1792)=14.767, p=0.001). Serval interactions were analysed. In total there are five significant differences, four main effects and one interaction between lighting conditions and camera angle.

The cluster assignment is one main effect. The post hoc test reveals that the evaluation of Cluster 3 differs significantly from Cluster 1, 2 and 4 while Cluster 1 does not differ from Cluster 4. Furthermore, Cluster 4 also differs from Cluster 2. The evaluation of the videos in consideration of the varying stocking densities differs significantly between 8 pigs per pen and 10 or 12 pigs per pen. The videos showing 8 pigs per pen were rated significantly better than the other videos. Though, there are no differences between 10 and 12 pigs per pen. The weight of the pigs also influenced the evaluation of the videos. The videos showing pigs with a weight of 65 kg were rated significantly better than the videos with pigs weighing 100 kg.

The camera angle was a further main factor. The videos which were made from a higher perspective tend to a higher rating. The factor lighting condition by itself does not influence the evaluation. The interaction between lighting conditions and camera angle is significant. As presented in Table 8, it can be seen that the camera angle leads to a different evaluation, if the video was taken in daylight; hence the videos from a higher perspective were rated more positively. In contrast, if the videos were filmed in an artificial light, the camera angle won't influence the participants' evaluation.

To sum up: there were not identified interactions between cluster assignment and varying factors in the videos. Furthermore, there are no interactions between housing and recording conditions. Interpreting the

Table 8. Results of the General Linear Model

General Linear Model, univariate		Evaluation of the videos in total[1,2]				
		N[#]	mean (SD)	F	Sig.	Partial η^2
Cluster	1 - uninvolved	256	22.15^{ac} *(22.12)*	23.04	0.001***	0.036
	2 - moderate	460	20.03^{a} *(22.59)*			
	3 - ethical minded	724	13.84^{b} *(18.54)*			
	4 - pragmatic	416	23.90^{c} *(24.90)*			
Stocking density	8 pigs per pen	487	24.34^{a} *(24.74)*	21.07	0.001***	0.022
	10 pigs per pen	441	16.90^{b} *(21.28)*			
	12 pigs per pen	928	16.75^{b} *(20.24)*			
Weight of pigs	65 kg	888	20.53 *(23.18)*	6.82	0.009**	0.004
	100 kg	968	17.17 *(20.72)*			
Lighting conditions	natural	462	17.70 *(20.36)*	2.21	0.137$^{n.s.}$	0.001
	artificial	1,394	19.14 *(22.50)*			
Camera angle	steep	935	19.46 *(20.36)*	6.39	0.01**	0.003
	low	921	18.08 *(22.50)*			
Lighting conditions * camera angle	natural light * steep angle	225	20.64 *(21.29)*	7.22	0.007**	0.004
	natural light * low angle	237	14.91 *(19.07)*			
	artificial light * steep angle	710	19.09 *(23.00)*			
	artificial light * low angle	684	19.18 *(21.98)*			

[#]four videos per person at random
[1]Mean values of three questions: Do you like the shown housing conditions in the pig fattening pen?, Are optimal housing conditions for pigs are given?, Would you accept the shown housing conditions in the future?
[2]measured on scale from 1 = strongly disagree to 100 = strongly agree
significance level: *=p≤0.05, **=p≤0.01, ***=p≤0.001, $^{n.s.}$= not significant, small letters indicate significant differences between clusters (post-hoc test GT2 Hochberg on the significance level p≤0.05)
Source: own calculation (2017)

effect size (partial eta squared) according to COHEN (1988), it should be noted that the cluster assignment is a main but small effect.

7 Discussion and Conclusion

Due to an increasing alienation from agriculture, picture communication in public relations (PR) has become important. Therefore, there were used videos of a pig fattening pen in the present study as stimuli to evaluate modern pig farming. Respondents evaluated four out of sixteen videos at random. The videos varied according to lighting conditions, camera angle, weight of pigs and stocking density. Based on belief in animal mind, interest and knowledge about pig production as well as meat consumption the respondents were segmented into four clusters. In an analysis of variance, it was analysed whether cluster assignment and varying factors in the videos are related to the evaluation of the videos. In the following, implications for picture communication in agricultural PR will be outlined.

7.1 Cluster Effects

The results of the analysis of variance show that respondents belonging to certain clusters are more important in explaining perceptions of livestock production than housing conditions and recording conditions. Respondents can be clustered based on belief in animal mind, their relation to agriculture and meat consumption. In summary, there were identified four clusters which also vary in relation to the evaluation of the shown videos. Remarkably, with regard to sociodemographic data, such as age, education, monthly net income and household size there are no significant differences between these clusters. In terms of gender, Cluster 2 and 3 tend to have a higher proportion of female respondents.

Overall, no interactions between cluster assignment and varying factors were identified. Therefore, it cannot be presumed that the varying factors in the videos have a differential strong impact on the clusters' evaluation of the videos. To give an example, this means that regardless of the cluster assignment, videos showing 8 pigs per pen were evaluated better than 12 pigs pen. This implies that cluster specific adaptions of the analysed video factors will not lead to better evaluations only within specific clusters, e.g. it would not be possible to improve evaluation of the ethical minded cluster by reducing the stocking density to similar levels of the other clusters as this change in stocking density would also improve the evaluation of all other clusters. Therefore, the effects of the varying factors can be related equally to all clusters. Nevertheless, the clusters differ to each other based on cluster-forming variables as well as evaluation of the videos. In the following, these differences and possible consequences for the agricultural PR will be discussed.

Cluster 1 is 'uninvolved'. Participants are uninterested and describe themselves as rather uninformed. This is probably related to the frequency of farm visits as the uninvolved Cluster 1 has only little contact to livestock farming. Most of respondents never have been on a farm. HEISE and THEUVSEN (2016a) carried out a cluster analysis based on i.a. involvement, perception of animal welfare and social acceptance of meat consumption. One of the clusters is similar to Cluster 1 of the present study (HEISE and THEUVSEN, 2016a). With regard to animal welfare labels, VECCHIO and ANNUNZIATA (2012) indicated a cluster which is described as inactive. The 'inactive' respondents have a low degree of interest in animal welfare and little knowledge about animal welfare labelling.

The attitudes of the respondents concerning the animal's mind are undecided. This could be due to the little to no knowledge about modern pig farming. It can be assumed that participants from Cluster 1 do not know how to judge. Although the videos were rated poorly, their evaluation, however, is better than the evaluation of Cluster 3. Overall, it can be noted that less interested respondents are also less critical towards modern livestock farming (BUSCH et al. 2013). As people's interest might be linked to the importance they attach to animal welfare related topics (EUROPEAN COMMISSION, 2007), it can be presumed with the help of PR that Cluster 1 would be hard to reach. Due to their little interest they probably do not search for information about modern livestock farming in the internet or in social media networks. As low interest is combined with little criticism, more critical clusters should be focussed on.

Cluster 2 is 'moderate. Participants describe themselves as uninformed and have diverse perceptions. Respondents of Cluster 2 describe pigs as being able to feel emotions and to act consciously, but they are unsure whether pigs are able to act and feel like human beings. Furthermore, the videos were rated poorly but similarly to Cluster 1 and 4. Besides, respondents of Cluster 2 are more interested in pig farming than participants from Cluster 1 but less in-

terested than those from Cluster 3. It can be assumed that in general this Cluster is receptive to agricultural PR campaigns, but information offered should be adapted to the information need of respondents. It can be summarised that this cluster is an important target group for agricultural PR.

Cluster 3 is 'ethical minded'. The respondents are most critical, while they are interested and informed. According to a cluster analysis of WEIBLE et al. (2016), citizens who have a better knowledge about agriculture were more critical towards modern pig production. In regard to items concerning pigs' abilities to feel emotions and to act consciously it can be noted that participants from Cluster 3 have a clear line of argumentation. They strongly agree to the statements concerning pigs' ability to feel emotions and to act consciously while they disagree that pigs are only guided by instinct and have less intense emotions than human beings. Overall, they have a strong belief in animal mind. This could be explained by their fundamental attitudes. A cluster analysis of HEISE and THEUVSEN (2016a) indicated a similar cluster, which is called 'interested animal welfare advocates'. In summary, due to the fundamental interest in pig farming it can be supposed that participants from Cluster 3 will be receptive to agricultural PR campaigns in the internet or social media channels and they will be easy to reach. But it can be assumed that due to their belief in animal mind and their poor evaluation, their low acceptance can be increased only limitedly. Furthermore, as they have the highest frequency of farm visits it can be supposed that farm visits are a good way to inform respondents of Cluster 3.

Cluster 4 is described as 'pragmatic'. Compared to Cluster 1 these respondents are also less critical, but they are interested and well-informed. Especially with regard to belief in animal mind, it can be assumed that participants from Cluster 4 think pragmatically. Respondents attribute the ability to feel emotions but they are rather unsure whether pigs feel emotions less intense than humans. Furthermore, they are sure that pigs are guided by instincts but they are rather unsure whether pigs are able to act consciously. Thus, compared to the other clusters their belief in animal mind is on lower level. Besides, respondents tend to have the most direct contact to farmers. Therefore, it can be suggested that these persons are closer to agriculture and have already gained their own experiences. Studies have shown that direct connection to farmers might increase people's acceptance (KÖCHER, 2009; ERMANN et al., 2017). Concerning PR, it can be concluded that the participants are easy to reach and receptive to agricultural PR. As high interest is combined with low criticism, Cluster 4 should be viewed as an important basis for PR.

Due to a different degree of interest and knowledge about pig farming and a different level of agreement with statements concerning belief in animal mind, it can be assumed that there is different need of information about modern pig farming between these four clusters. Furthermore, it can be assumed that it is necessary to provide information to specific target groups (MÖSTL and HAMM, 2016; VERBEKE, 2005). However, in order to be able to draw concrete conclusions further studies are necessary that also focus on how different framings of videos have impact on evaluation.

7.2 Effects of Recording and Housing Conditions

The results of the present study indicate that varying factors in the videos can influence people's perception and evaluation of videos from livestock farming. Concerning weight and thus age of the shown animals, a study by BUSCH et al. (2015b) indicates that pictures showing day-old-chicks were rated more positively. This can be explained by the concept of baby schema because younger animals look cuter than older ones (BUSCH et al., 2015b). In the present study, it can be concluded that the weight of pigs seems to affect the evaluation of the videos. It can be assumed that the differences in weight were not recognisable immediately as pigs with 65 kg are not perceived as young and cute anymore. Therefore, it cannot be ruled out that weight differences of younger pigs especially piglets could have a stronger impact on respondents' evaluation. In addition, the weight of pigs is associated with stocking density. In the present study, the available space for pigs weighing 65 and 100 kg was 0.75 m². It can be assumed that the available space in videos showing 65 kg pigs looks larger than in videos showing 100 kg pigs. To separate animal age and stocking density effects it would be necessary to vary stocking density according to live weight per square meter with same aged animals or vary age of animals at same stocking densities measured in live weight per square meter.

Stocking density based on number of animals per square meter is another factor which influences the evaluation of the videos. In the present study, videos showing 8 pigs per pen were rated significantly better than the other videos. In these videos the available

space per pig is increased by up to 66 %. Similar to BUSCH et al. (2015b) only a strongly reduced stocking density leads to a better rating. According to VANHONACKER et al. (2009) the group size is less important than the pen size. In the authors' opinion an increasing pen size might lead to a better evaluation.

In addition, stocking density is associated with the camera position (BUSCH et al., 2015a). In the study of BUSCH et al. (2015a) pictures which were made from a higher position (bird's-eye view) were rated more positively. An explanation could be that in a higher camera position respondents can evaluate the space allowance for pigs more easily than in a lower position (BUSCH et al., 2015a). Therefore, it can be confirmed that the stocking density and available space for pigs is an important evaluation criterion. Although it is difficult for laypersons to evaluate what an appropriate stocking density in pig fattening means (WILDRAUT et al., 2015), the results of the present study indicate that only strong reductions of currently common stocking densities have the potential to lead to better evaluations of pig fattening. Overall, it is confirmed that for citizens the space to move is an important animal welfare criteria (e.g. HEISE and THEUVSEN, 2016b; VANHONACKER et al., 2008; SATO et al., 2017).

Furthermore, the behaviour of the shown pigs remained unconsidered, while in a study of BUSCH et al. (2015a) the behaviour of animals has impact on the respondents' evaluation where lying pigs were described as sick and weak. A study of WILDRAUT et al. (2015) also indicated that consumers describe sleeping pigs as lethargic. In further studies pigs' behaviour should be analysed as well. Therefore, it cannot be concluded that pigs' behaviour has no effect on the evaluation.

In general, the videos were rated poorly. Nevertheless, due to an increasing urbanisation, citizens have no direct connection to farmers (FORUM MODERNE LANDWIRTSCHAFT, 2016) and therefore picture communication in PR is important to inform citizens about modern livestock farming. Overall, in the present study recording conditions have lower importance to the evaluation of the videos than housing conditions. With regard to the presentation of the pig fattening pen, the videos are similar to webcams recordings. To give an example, the webcam of Werner Schwarz shows two farrowing pen viewed from above. According to VAN WOERKUM and AARTS (2009) automated cameras are used to present an authentic version of reality. In comparison, manned cameras might lead to the risk of a subjective view (VAN WOERKUM and AARTS, 2009). However, studies in which webcam recording from animal husbandry was shown to citizens indicated that the use of webcams in agricultural PR is disputed. In general, webcams show that farmers do not hide anything. Results of two studies indicated that webcams might increase transparency, but do not increase acceptance (MÖSTL and HAMM, 2016; GAULY et al., 2017). GAULY et al. (2017) concluded that watching farm animal is less interesting than watching wild animals. Furthermore, according to MÖSTL and HAMM (2016) most of respondents stated that they would rather not recommend watching webcam videos to friends.

It can be assumed that the videos of the present study are unattractive and they do not provide positive activating stimuli. Furthermore, it can be supposed that respondents do not recognize minor differences of housing conditions in film material. As a result, pictures and videos showing livestock farming should be attractive and videos should be much more interesting (BUSCH et al., 2015a). A study of TIPLADY et al. (2015) indicated that videos showing animal cruelty were remembered very well and led to strong emotions even after 12 months. Depending on what and how they are displayed, videos might evoke different reactions. The example of animal cruelty shows that videos might also evoke strong emotions. Thus, for farmers and farmers' association it is important to deal with the design of videos for PR.

As a consequence, there cannot be derived no direct recommendation for agricultural and livestock PR. In the present study, it should be considered that the way how the pig fattening pen is presented is always the same way. For example, videos do not differ according to the viewing direction. Furthermore, no zoom into the scene or a panorama view was provided and only one pen was shown to the citizens. Therefore, citizens could only guess what is around the pig fattening pen. Thus, it cannot be excluded that other recording conditions might influence citizens' evaluation of videos showing modern livestock farming. It can be noted that there are no other comparable studies. As a result further studies are required. In this context, it would be interesting whether other recording conditions could lead to a better evaluation of the videos. One possibility is to use more colourful and contrasting video recordings to provide more activating stimuli to the viewer. Perhaps the videos were too colourless. Another possibility is to use a panorama view to give the participants a better overview what

happens around. Furthermore, according to TVERSKY et al. (2002), the viewer should be given the opportunity to zoom, change orientation, control speed and to review. Therefore, a further possibility is a 360° view, possibly combined with virtual reality equipment to allow more holistic experiences. Hence, an interactive farm visit is possible for urban citizens. In this context, videos showing modern livestock farming could be presented more attractively and provide activating stimuli.

Overall, the shown videos were rated poorly. Consequently, it can be concluded that there is only little to no acceptance of the shown housing system. Although fully slatted floors (STATISTISCHES BUNDESAMT, 2014e) and housing of small groups (HOY, 2012) are common housing conditions in Germany, it can be assumed that more animal-friendly housing conditions could lead to a better evaluation. The present study indicates that a reduced stocking density leads to a better evaluation of the videos. Overall, in further studies it should be analysed whether videos showing, e.g. an increasing pen size, a large group management, or straw bedding might be better evaluated than the videos in the present study. In general, pig farming needs to be more oriented towards society's demands. In dialogue with today's society modern pig farming should be discussed and further developed. In consideration of economic, ecological and animal-welfare-based aspects modern livestock farming should be improved.

7.3 Limitations

Overall, it can be summarised that the present study has only a small sample size. The survey took place throughout Germany but the sample is not representative in relation to characteristics, such as population density and household size. Compared to the national average, the respondents live in urban regions and in mainly small household sizes. Besides, the present sample is slightly biased towards younger and better educated persons.

With regard to the meat consumption, it should be noted that the respondents of the present study tend to have a higher meat consumption. In the EU 47 % of citizens eat two or three times a week and only 14 % more than five times meat products. The results are similar to Germany. In Germany most of the respondents eat two or three times a week meat products (EUROPEAN COMMISSION, 2013). In the present study 27% of respondents eat at least once a day meat and meat products.

The lack of representativeness should be taken into account when interpreting the results. It should be assumed that respondents tend to be more critical towards modern livestock farming. To give an example, according to KANTAR EMNID (2017) rural citizens tend to have a better opinion of modern livestock farming. These results are similar to the results of WEIBLE et al. (2016). The study indicates that more often 'opponents' of pig farming stated that they live in urban regions. Furthermore, due to the increasing urbanisation citizens have only little to no knowledge about animal husbandry, while rural citizens have rather a better knowledge about modern agriculture (EUROPEAN COMMISSION, 2007). Further studies indicated that younger (WOLF et al., 2015) as well as better educated citizens tend to be more critical (EUROPEAN COMMISSION, 2005). In summary, the sample is not representative. Hence, the results should be interpreted with caution.

In addition, further questions could have led to concrete conclusions regarding target group-specific PR. It can be noted that some information is missing, for example participants' need for additional information about animal husbandry. Furthermore, it would have been interesting to know whether the participants have already watched online videos about livestock farming and what kind of information sources have been used.

References

ALBERSMEIER, F. und A. SPILLER (2009): Das Ansehen der Fleischwirtschaft: Zur Bedeutung einer stufenübergreifenden Perspektive. In: Böhm, J., A. Albersmeier und A. Spiller (Hg.): Die Ernährungswirtschaft im Scheinwerferlicht der Öffentlichkeit, Band 4. 1. Auflage. Josef Eul Verlag, Lohmar: 213-250.

BENARD, M. and T. DE COCK BUNING (2013): Exploring the Potential of Dutch Pig Farmers and Urban - Citizens to Learn Through Frame Reflection. In: Journal of Agricultural and Environmental Ethics 26 (5): 1015-1036.

BOCK, B.B. and M.M. VAN HUIK (2007): Animal welfare: the attitudes and behaviour of European pig farmers. In: British Food Journal 109 (11): 931-944.

BOOGAARD, B.K., B.B. BOCK, S.J. OOSTING and E. KROGH (2010): Visiting a Farm: An Exploratory Study of the Social Construction of Animal Farming in Norway and the Netherlands Based on Sensory Perception. In: International Journal of Sociology of Agriculture and Food 17 (1): 24-50.

BOSCH, C. (2007): Optimierung der Gestaltung und Darbietung von Bildreizen in der Emotionsmessung. In: Schweiger, G. (Hrsg.): Emotionen im Marketing. Verstehen - Messen - Nutzen. 1. Auflage, Nachdr. Deutscher Universitätsverlag (Gabler Edition Wissenschaft Werbe- und Markenforschung), Wiesbaden: 311-526.

BUSCH, G., M. KAYSER und A. SPILLER (2013): „Massentierhaltung“ aus VerbraucherInnensicht - Assoziationen und Einstellungen. In: Jahrbuch der Österreichischen Gesellschaft für Agrarökonomie 22 (1): 61-70.

BUSCH, G., S. GAULY und A. SPILLER (2015a): Wie wirken Bilder aus der modernen Tierhaltung der Landwirtschaft auf Verbraucher? Neue Ansätze aus dem Bereich des Neuromarketings. In: Die Landwirtschaft im Spiegel von Verbrauchern und Gesellschaft. Schriftenreihe der Rentenbank, Band 31. Edmund Rehwinkel-Stiftung der Landwirtschaftlichen Rentenbank, Frankfurt am Main.

BUSCH, G., C. SCHWETJE und A. SPILLER (2015b): Bewertung der Tiergerechtheit in der intensiven Hähnchenmast durch Bürger anhand von Bildern: ein Survey-Experiment. In: German Journal of Agricultural economics 64 (3): 131-147.

CHILDERS, T.L. and M.J. HOUSTON (1984): Conditions for a picture-superiority effect on consumer memory. In: Journal of consumer research 11 (2): 643-654.

COHEN, J. (1988): Statistical Power Analysis for the Behavioral Sciences. Erlbaum, Hillsdale.

CORDTS, A., A. SPILLER, S. NITZKO, H. GRETHE und N. DUMAN (2013): Fleischkonsum in Deutschland – Von unbekümmerten Fleischessern, Flexitariern und (Lebensabschnitts-)Vegetariern. In: Fleischwirtschaft 7/2013: 59-63.

DE BACKER, C.J.S. and L. HUDDERS (2015): Meat morals: relationship between meat consumption consumer attitudes towards human and animal welfare and moral behavior. In: Meat science 99: 68-74.

DE BOER, J., H. SCHÖSLER and H. AIKING (2017). Towards a reduced meat diet: Mindset and motivation of young vegetarians, low, medium and high meat-eaters. In: Appetite 113 (1): 387-397.

DUIJVESTEIJN, N., M. BENARD, I. REIMERT and I. CAMERLINK (2014): Same Pig, Different Conclusions: Stakeholders Differ in Qualitative Behaviour Assessment. In: Journal of Agricultural and Environmental Ethics 27 (6): 1019-1047.

ERMANN, M., V. GRASKEMPER und A. SPILLER (2017): Die Wirkung von geführten Stallbesichtigungen auf Bürger – Eine Fallstudie auf nordwestdeutschen Schweinemastbetrieben. In: Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V., Band 52: 45-56.

EUROPEAN COMMISSION (2005): Attitudes of consumers towards the welfare of farmed animals. Special Eurobarometer 229. In: http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_229_en.pdf, update: 20.4.2018.

– (2007): Attitudes of EU citizens towards Animal Welfare. Special Eurobarometer 270 / Wave 66.1 - TNS Opinion & Social.

– (2013): Attitudes of Europeans towards Building the Single Market for Green Products. Flash Eurobarometer 367. In: http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_367_en.pdf, update: 20.4.2018.

FIELD, A. (2009): Discovering Statistics using SPSS. Sage Publications Ltd., London

FORUM MODERNE LANDWIRTSCHAFT (2016): Bundesbürger haben positives Bild von deutscher Landwirtschaft. Berlin. In: http://www.moderne-landwirtschaft.de/bundesbuerger-haben-positives-bild-von-deutscher-landwirtschaft-wissen-aber-wenig-ueber-sie, Abruf: 19.12.2017.

GRABER, D. (1996): Say it with pictures. In: American Academy of Political and Social Science 546 (1): 85-96.

GAULY, S., A. MÜLLER and A. SPILLER (2017): New methods of increasing transparency: Does viewing webcam pictures change peoples' opinions towards modern pig farming? Diskussionspapiere No. 1705. Department für Agrarökonomie und Rurale Entwicklung, Georg-August-Universität Göttingen.

HARTUNG, J. und F.J. SCHERMER (2010): Sozialpsychologie. 3. aktualisierte Auflage. W. Kohlhammer GmbH, Stuttgart.

HEISE, H. and L. THEUVSEN (2016a): What do consumers think about farm animal welfare in modern agriculture? Attitudes and shopping behaviour. In: International Food and Agribusiness Management Review 20 (3): 379-399.

– (2016b): Citizens' understanding of welfare of animals on the farm: An empirical study. In: Journal of Applied Animal Welfare Science 21 (2): 153-169.

HILLS, A.M. (1995): Empathy and belief in the mental experience of animals. In: Anthrozoös 8 (3): 132-142.

HOY, S. (2012): Schweinemast. Verlag Eugen Ulmer, Stuttgart.

JOHNSON, T.J. and B.K. KAYE (2004): Wag the Blog. How Reliance on traditional Media and the internet influence Credibility Perception of Weblogs among Blog Users. In: Journalism & Mass Communication Quarterly 81 (3): 622-642.

KANTAR EMNID (2017): Das Image der deutschen Landwirtschaft. Ergebnisbericht März 2017. information.medien.agrar e.V. In: http://www.bauernverband.de/mediaarchiv/grab_pic_chris.php?id=668279, Abruf: 19.12.2017.

KATZ, D. and E. STOTLAND (1959): A preliminary statement to a theory of attitude structure and change. In: Koch, S. (ed.): Psychology: A Study of a Science. Volume 3. Formulations of the Person and the Social Context. McGraw-Hill, New York: 424-456.

KÖCHER, R. (2009): Landwirtschaft und Gesellschaft. Einstellungen, Erwartungen, Erfahrungs- und Fernbild – Ergebnisse einer aktuellen Befragung. In: Burger, H.-G. (Hrsg.): Landwirtschaft 2020. Herausforderungen, Strategien, Verantwortung. 13.-15. Januar 2009 in Berlin. DLG-Verlag, Frankfurt, am Main: 227-248.

KROEBER-RIEL, W., P. WEINBERG und A. GRÖPPEL-KLEIN (2011): Konsumentenverhalten. 9. Auflage. Vahlens Handbücher der Wirtschafts- und Sozialwissenschaften. Franz Vahlen, München.

LASSEN, J., P. SANDOE and B. FORKMAN (2006): Happy pigs are dirty! Conflicting perspectives on animal welfare. In: Livestock Science 103 (3): 221-230.

LATVALA, T., M. NIVA, J. MÄKELÄ, E. POUTA, J. HEIKKILÄ, J. KOTRO and S. FORSMAN-HUGG (2012): Diversifying meat consumption patterns: Consumers’ self-reported past behaviour and intentions for change. In: Meat Science 92 (1): 71-77.

LOBINGER, K. (2012): Visuelle Kommunikationsforschung – Medienbilder als Herausforderung für die Kommunikations- und Medienwissenschaft. Springer Fachmedien, Wiesbaden.

MÖSTL, A. und U. HAMM (2016): Kommunikation landwirtschaftlicher Schweinehaltung über das Internet: Führt mehr Transparenz zu mehr Verbraucherakzeptanz? Abschlussbericht der Universität Kassel. In: https://www.q-s.de/services/files/qs-wissenschaftsfonds/Kommunikation-landwirtschaftlicher-Schweinehaltung-ueber-In.pdf, Abruf: 18.01.2018.

NIEGEMANN, H.M.,·S. DOMAGK, S. HESSEL, A. HEIN, M. HUPFER und A. ZOBEL (2008): Kompendium multimediales Lernen. Springer Verlag, Berlin.

PAIVIO, A. and K. CSAPO (1973): Picture Superiority in Free Recall. Imagery or Dual Coding? In: Cognitive Psychology 5 (2): 176-206.

PLAG, F. und R. RIEMPP (2007): Interaktives Video im Internet mit Flash. Springer-Verlag, Berlin.

ROVERS, A., M. MERGENTHALER, C. WILDRAUT, W.I. SONNTAG, M. V. MEYER-HÖFER and I. CHRISTOPH-SCHULZ (2017): Roundtable on hotspots in livestock production – A mixed-methods-approach for a better understanding of farmers' and consumers' views. Contribution presented at the XV EAAE Congress "Towards Sustainable Agri-food Systems: Balancing Between Markets and Society", August 29th - September 1st, 2017, Parma, Italy.

SANTOS, M.L.S. and D.A. BOOTH (1996): Influences on Meat Avoidance Among British Students. In: Appetite 27 (3): 197-205.

SATO, P., M. HÖTZEL and M. VON KEYSERLINGK (2017): American Citizens' Views of an Ideal Pig Farm. In: Animals 7 (64): 1-15

STATISTISCHES BUNDESAMT (2014a): Personen nach Geschlecht für Deutschland. Ergebnis des Zensus 2011 zum Berichtszeitpunkt 9. Mai 2011. In: https://ergebnisse. zensus2011.de/?locale=de#dynTable:statUnit=PERSON;absRel=PROZENT;ags=00;agsAxis=X;yAxis=GESCHLECHT, Abruf: 7.12.2017.

– (2014b): Personen nach Alter (10er-Jahresgruppen) für Deutschland. Ergebnis des Zensus 2011 zum Berichtszeitpunkt 9. Mai 2011. In: https://ergebnisse.zensus2011.de/?locale=de#dynTable:statUnit=PERSON;absRel=PROZENT;ags=00;agsAxis=X;yAxis=ALTER_10JG, Abruf: 7.12.2017.

– (2014c): Personen nach Höchster Schulabschluss für Deutschland. Ergebnis des Zensus 2011 zum Berichtszeitpunkt 9. Mai 2011. In: https://ergebnisse.zensus2011.de/?locale=de#dynTable:statUnit=PERSON;absRel=PROZENT;ags=00;agsAxis=X;yAxis=SCHULABS, Abruf: 7.12.2017.

– (2014d): Personen nach Größe des privaten Haushalts für Deutschland. Ergebnis des Zensus 2011 zum Berichtszeitpunkt 9. Mai 2011. In: https://ergebnisse.zensus2011.de/?locale=de#dynTable:statUnit=PERSON;absRel=PROZENT;ags=00;agsAxis=X;yAxis=HHGROESS_KLASS, Abruf: 7.12.2017.

– (2014e): Land- und Forstwirtschaft = Zahlen und Fakten. In: https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/LandForstwirtschaftFischerei/TiereundtierischeErzeugung/Tabellen/TabellenSchweine.html, Abruf: 20.4.2018.

– (2015): Gebiet und Bevölkerung. Ergebnisse auf Grundlage des Zensus 2011. In: http://www.statistik-portal.de/Statistik-Portal/de_jb01_jahrtab1.asp, Abruf: 7.12.2017.

– (2016): Bundesländer mit Hauptstädten nach Fläche, Bevölkerung und Bevölkerungsdichte am 31.12.2016. In: https://www.destatis.de/DE/ZahlenFakten/LaenderRegionen/Regionales/Gemeindeverzeichnis/Administrativ/Aktuell/02Bundeslaender.html, Abruf: 20.04.2018.

SCHENDERA, C.F.G. (2010): Clusteranalyse mit SPSS. Oldenbourg Wissenschaftsverlag, München.

SCHULZE, B., A. SPILLER und D. LEMKE (2007): Glücksschwein oder arme Sau? Die Einstellung der Verbraucher zur modernen Nutztierhaltung. In: Spiller, A. und B. Schulze (Hrsg.): Zukunftsperspektiven der Fleischwirtschaft – Verbraucher, Märkte, Geschäftsbeziehungen. Universitätsverlag, Göttingen: 465-488.

SONNTAG, W., A. KAISER und A. SPILLER (2016): Verbraucher kann man überzeugen. In: top agrar 2016 (10): 28-31.

SPILLER, A., M. GAULY, A. BALMANN, J. BAUHUS, R. BIRNER, W. BOKELMANN, O. CHRISTEN, S. ENTENMANN, H. GRETHE, U. KNIERIM, U. LATACZ-LOHMANN, J. MATINEZ, H. NIEBERG, M. QAIM, F. TAUBE, B.A. TENHAGEN und P. WEINGARTEN (2015): Wege zu einer gesellschaftlich akzeptierten Nutztierhaltung. Berichte über Landwirtschaft. Sonderheft Nr. 221. Bundesministerium für Ernährung und Landwirtschaft, Berlin.

TE VELDE, H.M., M.N.C. AARTS and C.M.J. VANWOERKUM (2001): Eten maar niet willen weten veehouders en consumenten over de omgang met dieren in de veehouderij. In: Te Velde, H.M., M.N.C. Aarts, C.M.J. vanWoerkum, C. Hanning and G.C.J. Smink (Hrsg.): Hoe oordelen we over de veehouderij? (What Do We Think of Livestock Farming?). Rathenau Institute, Den Haag.

TE VELDE, H., N. AARTS and C. VAN WOERKUM (2002): Dealing with ambivalence: farmers and consumers' perception of animal welfare in Livestock breeding. In: Journal of Agricultural and Environmental Ethics 15 (2): 203-219.

TIPLADY, C.M., D.B. WALSH and C.J.C. PHILLIPS (2015): Ethical Issues Concerning the Public Viewing of Media Broadcasts of Animal Cruelty. In: Journal of Agricultural and Environmental Ethics 15 (2): 203-219.

TVERSKY. B., J.B. MORRISON and M. BETRANCOURT (2002): Animation: can it facilitate? In: International Journal of Human-Computer Studies 57 (4): 247-262.

VANHONACKER, F., W. VERBEKE, E. VAN POUCKE and F.A.M. TUYTTENS (2008): Do citizens and farmers interpret the concept of farm animal welfare differently? In: Livestock Science 116 (1-3): 126-136.

VANHONACKER, F., W. VERBEKE, E. VAN POUCKE, S. Buijs and F. TUYTTENS (2009): Societal concern related to stocking density, pen size and group size in farm animal production. In: Livestock Science 123 (1): 16-22.

VANHONACKER, F., W. VERBEKE, E. VAN POUCKE, Z. PIENIAK, G. NIJS and F. TUYTTENS (2010): The Concept of Farm Animal Welfare: Citizen Perceptions and Stakeholder Opinion in Flanders, Belgium. In: Journal of Agricultural and Environmental Ethics 25 (1): 79-101.

VAN WOERKUM, C.M.J. and M.N.C. AARTS (2009): Visual transparency: Looking behind thick walls. In: Public Relations Review 35 (4): 434-436.

VECCHIO, R. and A. ANNUNZIATA (2012): Italian consumer awareness of layer hens' welfare standards: a cluster

analysis. In: International Journal of Consumer Studies 36 (6): 647-655.

VERBEKE, W. (2005): Agriculture and the food industry in the information age. In: European Review of Agricultural Economics 32 (3): 347-368.

– (2009): Stakeholder, citizen and consumer interests in farm animal welfare. In: Animal Welfare 18 (4): 325-333.

WEIBLE, D., I. CHRISTOPH-SCHULZ, P. SALAMON and K. ZANDER (2016): Citizens' perception of modern pig production in Germany: a mixed-method research approach. In: British Food Journal 118 (8): 2014-2032.

WILDRAUT, C., G. PLESCH, M. ZIRON, M. HARTMANN, J. SIMONS und M. MERGENTHALER, (2015): Multimethodische Bewertung von Schweinehaltungsverfahren durch Verbraucher anhand von Videos aus realen Schweineställen. Forschungsbericht, Fachbereich Agrarwirtschaft Soest 36. Fachhochschule Südwestfalen, Soest.

WIRTH, T. (2002): Missing Links. Über gutes Webdesign. Carl Hanser Verlag, München.

WOLF, C.A., G.T. TONSOR, M.G.S. MCKENDREE, D.U. THOMSON and J.C. SWANSON (2016): Public and farmer perceptions of dairy cattle welfare in The United States. In: Journal of Dairy Science 99 (7): 5892-5903.

WOLFRAM, J. und M. MERGENTHALER (2016): Bewertung von Pressebilder der Schweinehaltung durch Teilnehmer einer landwirtschaftlichen Fachtagung. Notizen aus der Forschung Nr. 22/2016. Fachhochschule Südwestfalen, Fachbereich Agrarwirtschaft, Soest.

ZERFASS, A. and R. TENCH (2012): Time for a Rethink? In: Communication Director 2012 (3): 24-29.

Acknowledgement

The authors would like to thank two anonymous reviewers for helpful comments and constructive suggestions. At South Westphalia University of Applied Sciences we would like to thank Prof. Dr. Martin Ziron for technical equipment and support in video recording and Agnes Ewert for proofreading and editing. We also appreciate the commitment of the farmer's family.

The research was conducted as part of the project 'SocialLab', which was funded by the Federal Ministry of Food and Agriculture.

Contact author:
ANNA WERNSMANN
South Westphalia University of Applied Sciences
Department of Agriculture
Lübecker Ring 2, 59494 Soest, Germany
e-mail: wernsmann.anna@fh-swf.de

Appendix

Figure A1. Screenshots of the 16 videos

V1: 65 kg, 8 pigs, artificial light, low angle

V2: 65 kg, 8 pigs, artificial light, steep angle

V3: 65 kg, 10 pigs, artificial light, low angle

V4: 65 kg, 10 pigs, artificial light, steep angle

V5: 65 kg, 12 pigs, artificial light, low angle

V6: 65 kg, 12 pigs, artificial light, steep angle

V7: 65 kg, 12 pigs, natural light, low angle

V8: 65 kg, 12 pigs, natural light, steep angle

V9: 100 kg, 8 pigs, artificial light, low angle

V10: 100 kg, 8 pigs, artificial light, steep angle

V11: 100 kg, 10 pigs, artificial light, low angle

V12: 100 kg, 10 pigs, artificial light, steep angle

V13: 100 kg, 12 pigs, artificial light, low angle

V14: 100 kg, 12 pigs, artificial light, steep angle

V15: 100 kg, 12 pigs, natural light, low angle

V16: 100 kg, 12 pigs, natural light, steep angle

Note: survey participants were shown coloured videos. The following screenshots were converted into black and white.
Source: own data (2016)