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What do consumers think about farm animal welfare in modern agriculture? Attitudes and shopping behaviour

RESEARCH ARTICLE

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Abstract

Several food crises damaged the image of the agricultural sector and consumers have lost trust, especially in animal production practices. Large parts of society believe that animal welfare standards in livestock production need to be improved. As a result, numerous animal welfare products have emerged on the market. This consumer paper identifies five clusters and, thus, strategic groups for the purchase of animal welfare products within the large group of consumers that differ significantly in their attitudes towards modern agriculture, their perception of animal welfare, their social acceptance of meat consumption and their shopping behaviour. Even personal differences are found between the clusters. Based on the results, we derived specific marketing implications for each cluster. These implications can help to develop a more differentiated market segment for animal welfare products in terms of animal welfare level and required price premium, enabling consumers to make product choices according to their preferences.

Keywords: attitudes, consumers, cluster analysis, farm animal welfare, shopping behaviour
JEL code: Q13, M31

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1. Introduction

Due to several food crises and food scares in the recent past, the image of the agricultural sector has heavily been damaged and consumers have lost trust, especially in animal production practices (e.g. Grunert, 2005; Kanis *et al.,* 2003; Vanhonacker and Verbeke, 2014). The broader public is increasingly concerned about farm animal welfare (FAW), and large parts of society believe that animal welfare standards in livestock production need to be improved (De Jonge and van Trijp, 2013; European Commission, 2007a). Several studies have shown that German citizens are particularly attentive to issues concerning FAW (European Commission, 2005; Schulze *et al.,* 2008). Thus, moral and ethical considerations increasingly determine consumers' meat consumption (Mäkiniemi *et al.,* 2011; Rozin *et al.,* 1997; Schröder and McEachern, 2004). Moral and ethical value conflicts surrounding meat purchase decisions have deepened in Western societies in recent decades; in response, consumers have developed varying strategies to reduce their feelings of guilt (Te Velde *et al.,* 2002). Some tend to 'de-animalize' meat so as not to be reminded of the fact that animals have to be slaughtered before becoming a food product (Buller and Cesar, 2007; Schröder and McEachern, 2004). Others respond to their growing concerns by decreasing their consumption of meat or even by becoming vegetarians or vegans (Harper and Henson, 2001; Vanhonacker *et al.,* 2010). Additionally, the number of consumers who prefer meat from more animal-friendly production systems has been constantly increasing for the past several years (Blandford and Fulponi, 1999; Burda Community Network, 2009; Deimel *et al.,* 2010; European Commission, 2007b; Lusk and Norwood, 2012; Schulze *et al.,* 2008).

As a result, a number of animal welfare products (AWPs) have emerged on the market. But, despite promising signals from market research studies, these products are still very rare and, with few exceptions (e.g. Switzerland, the United Kingdom and the Netherlands), AWPs have not yet attained any great importance in the European meat market. Even though the majority of EU consumers advocate higher animal welfare standards, they face a number of key barriers during the purchase of animal-friendly meat and meat products: lack of appropriate information on animal welfare standards, information overload and asymmetries, lack of availability of animal-friendly products in retail shops, perceived lack of individual influence on overall welfare standards in livestock production, disassociation from food production and high additional costs (Harper and Henson, 2001). These barriers often lead to attitude-behaviour discrepancies, which are also known as the 'consumer-citizen gap' (Coff *et al.,* 2008; Harvey and Hubbard, 2013; Vanhonacker *et al.,* 2010).

Numerous studies have already investigated determinants of consumer behaviour in food purchase situations and concluded that this behaviour is crucially dependent on consumer attitudes and beliefs as well as on personal characteristics like sociodemographics and lifestyle (e.g. Nocella *et al.,* 2010; Schulze *et al.,* 2008; Vanhonacker and Verbeke, 2014). However, most studies have tended to focus only on specific aspects of this topic (e.g. the role of consumer trust in shopping behaviour or consumers' conception of animal welfare) (Frewer *et al.,* 2005; Nocella *et al.,* 2010; Vanhonacker *et al.,* 2010). These studies indicate clearly that, depending on various parameters, consumers differ considerably in their attitudes towards FAW and, thus, in their buying behaviour.

Because of these differences, separate target groups can be identified regarding the purchase of AWPs. To meet the requirements of these heterogeneous consumer demands and to reduce the discrepancies between consumer attitudes and shopping behaviour, the market segment for AWPs prospectively needs to become more differentiated (e.g. Verbeke, 2009).

The present study uses the broad literature base as a starting point for a comprehensive and representative quantitative survey of German consumers. The specific aspects analysed in the existing studies are brought together to acquire a detailed overview of consumers' attitudes and personal characteristics as well as their shopping behaviour. Thus, this paper complements previous research with a comprehensive empirical study intended to identify different clusters and, thus, strategic groups for the purchase of AWPs within the larger group of consumers and helps to develop appropriate market segmentation.

The remainder of the paper is organized as follows: In Section 2 we present the literature that forms the basis of the study. Section 3 introduces materials and methods, and Section 4 presents the empirical results. The paper closes with a discussion of the results (Section 5), some implications for food marketing (Section 6) and concluding remarks (Section 7).

2. Literature review: state of research

Several studies have investigated consumers' attitudes towards modern agriculture and FAW, their information behaviour and the effects of these factors on consumers' shopping behaviour. The results of these studies are presented in the following section, as they constitute the basis for our empirical research.

Overall, consumers are increasingly aware of grievances in agricultural production and have, therefore, become more and more critical towards modern agriculture. Kayser (2012) showed that 70% of press articles on agriculture and 85% of the comments on agricultural issues in online social media are negatively connoted. The deterioration of its image is especially true for intensive livestock production. Press and other media coverage of the criticism of animal husbandry, transportation and slaughtering have resulted in a highly emotional controversy about current practices in conventional livestock production (Deimel *et al.,* 2011; Franz *et al.,* 2012). Schulze *et al.* (2008) showed that only 18% of their respondents rated the husbandry conditions in modern livestock production as 'rather good' or 'good'. Furthermore, several studies have found that consumers who are particularly critical of modern animal production systems show a higher willingness to pay a price premium for particularly animal-friendly products compared to unconcerned consumers (Schulze *et al.,* 2008; Vanhonacker *et al.,* 2007). In a very recent study, 89% of the German consumers surveyed expressed a willingness to pay more for more animal-friendly products, with young consumers showing the highest willingness to pay more for higher animal welfare standards (BMEL, 2016).

These numbers clearly illustrate that large parts of society have lost trust in animal production practices (Grunert, 2005; Kanis *et al.,* 2003; Vanhonacker and Verbeke, 2014). This is underlined by Busch *et al.* (2015), who reported that only 26.8% of German consumers trust livestock producers and only 38.2% believe that farmers take good care of their animals.

Consumers use the information given on food products to make informed choices (Frewer *et al.,* 2004; Mayfield *et al.,* 2007). Since FAW is a credence attribute whose true level cannot be evaluated by consumers either before or after consumption, labels have become important communication tools about animal welfare standards. However, consumers still consider the level of animal welfare-related information to be insufficient (Vanhonacker *et al.,* 2010). A European study determined that 41% of consumers wish to be better informed about the living conditions of farm animals (European Commission, 2007a). Furthermore, people often feel misled by labels and fear they will be cheated by retailers (Schröder and McEachern, 2004). This loss of trust constitutes a severe problem particularly for the marketing of AWPs, as not only animal welfare but also the reliability of labels is a credence attribute that cannot be verified by the consumers. Thus, credence goods such as food products labelled animal-friendly are only purchased if the consumers trust the information provided (Vanhonacker and Verbeke, 2014).

The public controversy about livestock production focusses especially on large-scale farming, a term that has clearly negative associations for the majority of consumers (Boehm *et al.,* 2010; Busch *et al.,* 2013). Thus, the public is increasingly concerned about the conditions of farm animals in large-scale intensive production systems, where a high number of animals are kept per unit (Heyder and Theuvsen, 2009; Kanis *et al.,* 2003; Kayser *et al.,* 2012a; Vanhonacker *et al.,* 2010). Busch *et al.* (2013) showed that consumers who are particularly concerned about large-scale farming are more willing to change their consumption habits than consumers who are less concerned about intensive livestock production methods.

These concerns have led to an increasing number of people reducing their meat consumption in recent years (Harper and Henson, 2001, Vanhonacker *et al.,* 2010). Even though the vast majority of consumers still

want to eat meat on a regular basis (BMEL, 2016), a growing segment of the population is convinced that animals should not be reared for slaughter (Povey *et al.,* 2001) and attach high importance to ethical issues when buying animal-based food products (Vanhonacker and Verbeke, 2009). This increasingly threatens the social acceptance of meat production and consumption, as more and more consumers question the legitimacy of conventional livestock production systems (Kauppinen *et al.,* 2010). Several studies have shown that the frequency of meat consumption crucially influences people's attitudes towards FAW and their willingness to pay a price premium for AWPs. Furthermore, people with strong ethical attitudes towards animal production tend to attach minor importance to price and the availability of animal food products (Schulze *et al.,* 2008; Vanhonacker *et al.,* 2007; Vanhonacker and Verbeke, 2009).

Even involvement in agricultural topics influences consumers' perceptions of modern livestock production and, therefore, affects their shopping behaviour. Verbeke and Vackier (2004) showed that consumers who are more involved reveal a smaller discrepancy between attitude and actual behaviour and attach greater importance to FAW. However, alienation from agricultural production has led to low involvement and thus low awareness of the actual design of production processes involved in animal-based products for large parts of society in Western industrialized countries (Frewer *et al.,* 2005; Kanis *et al.,* 2003; Te Velde *et al.,* 2002; Vanhonacker *et al.,* 2010). According to Busch *et al.* (2013), only 26% of consumers feel rather well- or well-informed about agricultural topics. Against this background, many consumers use mass media, like television, newspapers or the internet, as sources of information about agricultural topics (TNS Emnid, 2012). These media are often characterized by very critical, negatively connoted news coverage on agriculture (Kayser, 2012).

Despite (or because of) the overall alienation from the agricultural sector, there is growing interest in FAW in livestock production, at least from certain parts of society (De Jonge and van Trijp, 2012; Harper and Henson, 2001; Vanhonacker and Verbeke, 2014). This interest is positively associated with pro-welfare behaviour and lower perceived barriers for the purchase of products subject to enhanced animal welfare standards (Vanhonacker and Verbeke, 2009). Additionally, greater awareness of agricultural production processes often negatively affects attitudes towards modern agriculture (Kayser *et al.,* 2012b). Highly interested and well-informed consumers are, therefore, often more critical towards livestock production than less informed consumers (Busch *et al.,* 2013).

Consumer concerns about livestock production are often related to the perceived level of FAW during production processes (Deimel *et al.,* 2011; Franz *et al.,* 2012; European Commission, 2005). A cross-national survey showed that 77% of European consumers believe that the FAW standards need to be improved (European Commission, 2005). However, these sentiments run even higher in Germany. In a recent study by the German Ministry of Food and Agriculture, 88% of the respondents agreed that FAW needs to be improved (BMEL, 2016).

Consumers often associate higher animal welfare standards with higher product quality. In this way, animal welfare standards are linked to intrinsic quality attributes like taste, healthiness or product safety (Meuwissen and van der Lans, 2004; Phan-Huy and Fawaz, 2003). Thus, consumers transform the credence attribute FAW into an experience attribute that can be confirmed after purchase (Nocella *et al.,* 2010).

Attitudes towards FAW and shopping behaviour are also influenced by many sociodemographic and other personal characteristics. Several studies indicate that women are more likely to buy AWPs than men, as they accept higher price premiums for these products (Kehlbacher *et al.,* 2012; Makdisi and Marggraf, 2011; Nocella *et al.,* 2010; Schulze *et al.,* 2008; Vanhonacker and Verbeke, 2009). Even age influences consumers' attitudes and, thus, affects their shopping behaviour. However, results vary with respect to this characteristic. While most studies indicate that older people are more animal welfare-sensitive (Makdisi and Marggraf, 2011; Schulze *et al.*, 2008; Nocella *et al.,* 2010), other studies conclude that middle-aged persons show the greatest willingness to pay price premiums for products with enhanced animal welfare standards (Vanhonacker and Verbeke, 2009). Negative relationships between age and the accepted price premium have even been observed

(Kehlbacher *et al.,* 2012). Furthermore, the income and education of consumers are also decisive. Bennet and Blaney (2002) found that concern about FAW and willingness to pay more for AWPs increase with level of education and income (Kehlbacher *et al.,* 2012; Makdisi and Marggraf, 2011; Vanhonacker and Verbeke, 2009). Occupation, household size, place of residence, preferred shopping location for meat and frequency of meat consumption are further determinants of consumers' shopping behaviour (Makdisi and Marggraf, 2011; Nocella *et al.,* 2010; Schröder and Mc Eachern, 2004; Schulze *et al.,* 2008; Vanhonacker *et al.,* 2010).

To sum up, there is a broad range of information on various aspects of consumers' attitudes towards FAW and their consumption of meat and other products of animal origin, as well as their information behaviour and shopping habits. But the overall picture still tends to be scattered, and a comprehensive picture is missing.

The information presented in this chapter constitutes the basis for our comprehensive empirical study. We also included consumers' perceptions of the potential market effects of higher animal welfare standards, which may be helpful in better anticipating the prospective market development for AWPs and the consequences for intensive livestock production.

3. Material and methods

Study design

German consumers throughout the entire country were surveyed in October 2015 by means of a standardized online questionnaire. In order to acquire a sample distribution representative of the German population with regard to gender, age, place of residence, education and income, respondents were recruited via a panel company[1]. After purging incomplete questionnaires and outliers, 516 data sets were left for further analysis.

The statements regarding consumers' perceptions of FAW were mostly measured using five-point Likert scales from -2 = 'I totally disagree' to +2 = 'I totally agree'. Furthermore, nominally scaled questions were used to inquire about respondents' sociodemographics and other personal characteristics concerning lifestyle.

The questionnaire was divided into several parts. The first part concentrated on sociodemographic and lifestyle characteristics. Next, participants were asked to indicate what they consider particularly important for the level of FAW. Then, they were asked to evaluate various statements concerning FAW and the need to enhance animal welfare standards in modern livestock production. In addition, consumers were asked to give their personal opinions about the potential market for AWPs and their perception of the social acceptance of meat consumption. Even the effects of higher animal welfare standards on other quality attributes like taste or healthiness were questioned. The final section of the questionnaire dealt with consumers' behaviour when purchasing food products and their willingness to pay a price premium for AWPs.

Statistical analysis

The data were analysed using SPSS Statistics 22 (IBM, Armonk, NY, USA) (Backhaus *et al.,* 2011). First, frequency distributions of sociodemographic and lifestyle characteristics were conducted to acquire a brief overview of the participants. Next, an explorative factor analysis was conducted to reduce the number of items and to capture the central dimensions based on consumers' perceptions of FAW (Franz *et al.,* 2012). The analysis contained all Likert-scaled statements mentioned in the previous paragraph, excluding the variables concerning the perceived quality of AWPs and consumers' shopping behaviour.

We conducted a factor analysis to identify latent constructs underlying the respondents' attitudes towards modern agriculture and FAW. Variables that correlated highly were grouped together in one factor to separate them from less highly correlated groups. Then, principal component analysis was used to summarize the

[1] To see details of the sample composition compared to the basic population in Germany see Supplementary Table S1.

variables that load highly on one factor. We removed from the analysis all variables that showed loadings ≥0.4 on more than one factor because a clear assignment to only one factor was not possible (Backhaus *et al.*, 2011). In order to facilitate the interpretation of the factors, an orthogonal Varimax rotation was used to maximize the variance of the squared factor loadings by column (Backhaus *et al.,* 2011). The quality of the factor analysis was verified using the Kaiser-Meyer-Olkin criterion and the Bartlett test for sphericity with subsequent reliability analysis (Brosius, 2011).

Based on the extracted factors, we carried out a cluster analysis to classify the consumers into groups according to their attitudes towards agricultural topics and FAW. We applied a hierarchical clustering method using the single-linkage method. The optimal number of clusters was then identified using Ward's method. Depicting the merger process graphically through a dendrogram and applying the elbow criterion helped us to find the best cluster solution (Backhaus *et al.,* 2011). We refined the resulting solution, using a K-means cluster analysis (Bacher *et al.,* 2010; Janssen and Laatz, 2007) and used discriminant analysis to check its results (Backhaus *et al.,* 2011). To characterize the different groups in greater depth, analysis of variance with post hoc tests were used showing no variance equity (Brosius, 2011; Everitt, 1998). Means of cluster-building factors and further cluster-describing variables usually only deviate slightly within the respective cluster while means of a variable in different clusters usually differ greatly (Brosius, 2011). Results of the analysis of variance must not be interpreted as a full significance test as data for the analysis of variance statistic is the same as for clustering. Thus, the post hoc tests do not represent independent tests of significance. For this reason, results should be interpreted as an indication for the mean differences between the clusters. The post hoc tests are of great importance to show differences between the clusters and to characterize the clusters in detail (Brosius, 2011).

4. Results

Factor analysis

To reduce complexity and to identify the most important factors influencing consumers' attitudes towards modern agriculture and FAW, we conducted an explorative factor analysis. The final factor solution included six factors with 24 variables (Table 1). The first factor, 'Involvement in agriculture and livestock production', describes the knowledge and interest in agricultural topics from the consumers' point of view, combining statements concerning their perceived knowledge, their interest and their information sources. The second factor, 'Perception of animal welfare in livestock production', summarises seven statements about how consumers view FAW and their perception of how farmers treat livestock. The third factor, 'Conception of animal welfare and animal welfare standards', combines four statements about the importance of health, natural innate behaviour and husbandry system for the level of animal welfare as well as the enhancement of animal welfare standards for livestock production. The fourth factor, 'Animal welfare, the market and stakeholders', comprises variables that reflect the consumers' positions towards the market effects of higher animal welfare standards and the products of more animal-friendly husbandry systems. Additionally, the statement 'Politicians, journalists and consumers cannot evaluate whether or not farm animals are kept under good conditions' is also included in this factor. The fifth factor 'Social acceptance of meat consumption' summarizes two statements concerning the acceptance of eating meat among family and friends and by society in general. The last factor, 'Animal welfare and farm size', consists of two statements inquiring whether consumers think that the level of animal welfare depends on farm size.

The tests conducted to examine the quality of the factor analysis indicated that all factors meet the common requirements. The factor analysis explains 65.41% of the total variance among the 24 variables. These variables are well suited for the factor analysis as the Kaiser-Meyer-Olkin measure of sampling adequacy is relatively high at 0.820. Additionally, Bartlett's test of sphericity was statistically significant, yielding correlation coefficients for the population with values different from zero. The reliability analysis showed that the internal consistency of the factors is adequate (Backhaus *et al.,* 2011; Bühl, 2010). In the next step, we used the determined factors as cluster-building variables.

Table 1. Results of the factor analysis.[1]

Factors and underlying statements[2]	Agree (%)[3]	FL[4]
Involvement in agriculture and livestock production (Cronbach's alpha=0.922)		
I know a lot about agricultural topics.	19.9	0.900
I regularly use media to keep informed about agricultural topics.	36.2	0.890
I am interested in agricultural topics.	46.2	0.867
I know a lot about livestock production.	26.9	0.850
I regularly use the agricultural trade press for information on agricultural topics.	15.9	0.833
Perception of animal welfare in livestock production (Cronbach's alpha=0.816)		
Farm animals in livestock production systems feel comfortable.	12.0	0.828
Farmers take good care of their farm animals.	19.6	0.789
The health status of farm animals is good.	22.5	0.734
Farm animals can show their natural innate behaviour in agricultural husbandry systems.	19.9	0.721
The agricultural sector is honestly interested in improving FAW.	28.2	0.651
A farm animal with good performance also feels comfortable.	30.8	0.551
A farm animal that is not used to an outdoor paddock does not miss it.	6.0	0.489
Conception of animal welfare and animal welfare standards (Cronbach's alpha=0.830)		
Good health is particularly important for the level of animal welfare.	95.8	0.869
The structural-technical systems used in barns are particularly important for the level of animal welfare.	90.9	0.857
Animals must be able to engage in their natural behaviour; only then can they feel comfortable.	92.1	0.818
The animal welfare standards for farm animals should be enhanced.	88.4	0.610
Animal welfare, the market and stakeholders (Cronbach's alpha=0.662)		
Higher national animal welfare requirements will lead to more imported meat.	26.7	0.804
Higher national animal welfare requirements will lead to competitive disadvantages for German farmers on international markets.	37.8	0.792
Products from more animal-friendly production systems will always occupy only market niches.	29.1	0.574
Politicians, journalists and consumers cannot evaluate whether or not farm animals are kept under good conditions.	26.5	0.486
Social acceptance of meat consumption (Cronbach's alpha=0.794)		
Eating meat is socially accepted.	77.1	0.887
My friends and family accept the consumption of meat.	81.0	0.875
Animal welfare and farm size (Cronbach's alpha=0.670)		
Small farms are more easily able to implement higher animal welfare requirements than large farms.	44.6	0.837
Animals feel more comfortable on small farms than on large farms.	64.5	0.805

[1] KMO (Kaiser-Meyer-Olkin measure) = 0.820; explained variance = 65.41%.

[2] Scale from +2 = 'totally agree' to -2 ='totally disagree'.

[3] Numbers refer to the sum of the percent data relating to categories +2 and +1; n=657.

[4] FL= Factor loading; n=524.

Cluster analysis

Based on the factors identified, a cluster analysis was conducted. The aim was to group the consumers into clusters according to their involvement in agricultural topics and attitudes towards FAW and meat consumption.

First, the single linkage method was applied in order to eliminate eight outliers from the sample. Since the scree test and the dendrogram did not clearly show the optimal number of clusters, additional plausibility considerations were undertaken to determine the optimal number of clusters, yielding a five-cluster solution (Backhaus *et al.,* 2011). The approximate solution of Ward's method was optimised by 18 iterations using K-means clustering (Brosius, 2011).

Several criteria indicate that the solution reached is of high quality. The clusters are quite homogeneous as all the F-values are less than one. Additionally, eta is 0.69 on average, showing that there are significant differences among the cluster-building factors and the variance within the clusters is low. Furthermore, eta[2] is 0.43, indicating that, on average, the cluster-building factors can explain 43% of the variance between the clusters. Moreover, discriminant analysis confirmed that the accuracy of classification is 96.5% and, therefore, meets the requirement stipulated in the literature (Backhaus *et al.,* 2011).

To describe the clusters, mean comparisons were conducted using one-way analysis of variance based on the factors. To describe the clusters in greater detail, the following were also used for variance analysis: the individual variables in the factors, sociodemographic and lifestyle characteristics and variables describing the perceived effects of higher animal welfare standards on other quality attributes and the shopping behaviour of the respondents. In order to examine significant differences among the means of the clusters, Tamhane's T2 post hoc comparisons complemented the cluster description (Backhaus *et al.*, 2011; Everitt, 1998). Table 2 gives the results of the cluster analysis, showing the means of the cluster-building factors[2].

The first cluster (cluster A) is characterized by a comparatively strong interest in agricultural topics and agreement with higher animal welfare standards. Consumers in this cluster are, therefore, called 'interested animal welfare advocates'. With 118 participants, this cluster is the largest. In comparison to the other clusters, these persons are best informed about agriculture and livestock production in particular and know more about agricultural topics than the members of the other clusters (μ=0.33; SD=0.89). Their perceptions of FAW are diverse (μ=-0.02; SD=0.96), but they are quite sure that welfare standards for farm animals should be enhanced (μ=1.66; SD=0.59). Health, husbandry system and natural innate behaviour are very important to them. They are unsure about the market effects of higher national animal welfare requirements and rank all of the variables belonging to this factor in the range of zero (μ=-0.12; SD=0.79). Compared to the other clusters, they view the social acceptance of meat consumption most critically (μ=-1.07; SD=0.74). Furthermore, they slightly agree that the level of animal welfare is better on small farms (μ=0.07; SD=0.92).

[2] To see the means of the underlying statements of the cluster-building factors, see Supplementary Table S2.

Table 2. Results of the cluster analysis.[1]

Variables	Cluster A	Cluster B	Cluster C	Cluster D	Cluster E
Number of cluster members (n)	118	109	115	97	77
Involvement in agriculture and livestock production[2]	0.33^{bde}	-0.06^{a}	0.18^{de}	-0.22^{ac}	-0.42^{ac}
Perception of animal welfare in livestock production[2]	-0.02^{de}	-0.18^{cde}	0.33^{bd}	-0.63^{abce}	0.59^{abd}
Conception of animal welfare and animal welfare standards[2]	0.39^{ce}	0.39^{ce}	0.16^{abe}	0.32^{ae}	-1.80^{abcd}
Animal welfare and the market[2]	-0.12^{bcde}	-1.13^{acde}	0.56^{ab}	0.54^{ab}	0.28^{ab}
Social acceptance of meat consumption[2]	-1.07^{bcde}	0.54^{ae}	0.55^{ae}	0.51^{ae}	-0.60^{abcd}
Animal welfare and farm size[2]	0.07^{cd}	0.06^{cd}	-0.74^{abde}	0.79^{abce}	-0.08^{cd}

[1] Scale from +2 = 'totally agree' to -2 = 'totally disagree'; superscript letters indicate a significant difference with the corresponding cluster (Tamhane's T2 post hoc test).

[2] Variables are significant at $P \leq 0.001$.

Cluster B can be described as 'uninformed animal welfare advocates' and comprises 109 consumers. They are rather uninterested in agricultural topics and do not think that they know much about these issues (μ=-0.06; SD=0.93). Their perception of FAW is quite diverse (μ=-0.18; SD=0.90), ranking most of the statements around zero. Nevertheless, they are firmly convinced that the animal welfare standards for farm animals should be enhanced (μ=1.73; SD=0.50) as they attribute high importance to health, husbandry system and natural innate behaviour. They view the market for products from animal friendly production systems rather uncritically (μ=-1.13; SD=0.73); furthermore, participants in this cluster believe that meat consumption is socially accepted (μ=0.54; SD=0.66). They are unsure if small farms are more easily able to implement higher animal welfare standards (μ=0.24; SD=1.04), but they think that animals feel more comfortable on small farms (μ=1.03; SD=0.71).

A total of 115 consumers belong to cluster C, 'the market-conscious animal welfare proponents'. These consumers have diverse perceptions of their knowledge about and interest in agriculture and livestock production (μ=0.18; SD=1.02). On average, they have neither a negative nor a positive perception of FAW (μ=0.33; SD=0.94). In comparison to the other clusters, these consumers are most critical towards the market effects of higher animal welfare requirements as they agree that higher national animal welfare standards will cause problems for German farmers and that more animal-friendly products will continue to occupy only niche markets in future (μ=0.56; SD=0.81). They are convinced that meat consumption is socially accepted (μ=0.54; SD=0.62). Furthermore, members of cluster C are rather undecided as to whether farm size actually influences the level of FAW. They rate the influence of farm size on FAW lower than the other clusters (μ=-0.74; SD=0.92).

Cluster D consists of 'critical proponents of animal welfare on small farms'. Participants in this cluster are rather uninterested in agriculture and livestock production and rate their own knowledge comparatively low (μ=-0.22; SD=1.01). Members of cluster D are most critical concerning the current level of FAW (μ=-0.63; SD= 0.92) and consider the importance of good health, appropriate behaviour and the structural-technical equipment of barns as comparatively important for FAW. The enhancement of animal welfare standards is most important for them (μ=1.74; SD=0.50). They are pessimistic about the market for AWPs (μ=0.54; SD=0.80) and tend to see disadvantages for German agribusiness in the implementation of additional national animal welfare requirements. They strongly believe that meat consumption is socially accepted (μ=0.51; SD=0.70). Furthermore, they are convinced that small farms can more easily implement higher animal welfare standards and that animals feel more comfortable on small farms (μ=0.79; SD=0.72).

The last cluster (cluster E) is the smallest group, with 77 participants. They are called 'the uninvolved' as consumers in this cluster have neither a negative nor a positive attitude towards most of the statements. They are the most uninterested in agricultural topics and perceive their own knowledge as rather low (μ=-0.42; SD=1.01). They rate factor two statements mostly in the zero range (μ=0.59; SD=0.85); thus, they are the least critical cluster in their rating regarding the level of animal welfare. They are rather unsure about animal welfare standards (μ=-1.80; SD=0.97) and do not really have an opinion about the market effects of enhanced national animal welfare requirements (μ=0.28; SD=0.70). 'The uninvolved' tend to believe that meat consumption is socially accepted and slightly agree that FAW is dependent on farm size (μ=-0.08; SD=0.81).

The clusters differ with regard to some interesting sociodemographic and lifestyle characteristics, which are shown in Supplementary Table S3.

The 'interested animal welfare advocates' are the cluster with the highest proportion of women. Participants in this cluster are often responsible for the household and disproportionately often have a net household income between € 3,000 and € 3,999 per month. Compared to the other clusters, participants in cluster A had the most religious education as a child and are still more active in religion than participants in the other clusters, even though they slightly disagree with these statements. Compared to the rest of the sample, participants in cluster A most often grew up in a small city. Furthermore, this is the cluster with the lowest meat consumption. More than 10% of the cluster members do not eat meat.

The 'uninformed animal welfare advocates' are characterized by the highest educational level, with more than 42% holding a high school certificate. A large proportion are employed and, therefore, not responsible for the household. Furthermore, this is the cluster with the highest percentage of people earning ≥€ 4,000 per month. Members of this cluster disproportionally often live in northern Germany.

Nearly all the sociodemographic and lifestyle characteristics of cluster C ('the market-conscious animal welfare proponents') lie between the other clusters, showing no extreme characteristics. The only exception is that the proportion of persons consuming meat is higher than in the other groups.

Members of cluster D, 'the proponents of animal welfare on small farms', are slightly younger than members of the other clusters, but this difference is not at a significant level. Compared to the other clusters, cluster D is the group with the highest proportion of pupils, apprentices and persons who have not yet completed an apprenticeship. Their education and lifestyle is less religious compared to the other clusters, and they more often live in eastern Germany. In comparison to the other respondents, members of cluster D disproportionally often have no connection to agriculture, with no friends or family working in this business.

'The uninvolved' (cluster E) are characterized by the lowest share of women and the smallest proportion of persons holding a high school certificate. They less likely to have grown up in small cities compared to the other clusters; members of cluster E comparatively seldom have a connection to agriculture through friends or family.

To analyse whether consumers perceive FAW as having an influence on other quality attributes like healthfulness or taste, Table 3 shows the means for the quality-related statements in each cluster. It is clear that consumers see close connections between the conditions under which farm animals are reared and meat quality since the overall means for all statements are greater than 1, indicating relatively strong agreement. Comparing the five clusters clearly shows that the perceived meat quality of AWPs differs significantly among the clusters. Clusters A, B and D rate all statements quite similarly and show comparatively strong commitment. Even the participants in cluster C positively evaluate the effects of higher animal welfare standards on meat quality, but they are not as convinced as participants in clusters A, B and D. Again, participants in cluster E tend to be undecided when it comes to the effects of FAW on meat quality.

Table 3. Animal welfare and meat quality.[1]

Variables	Cluster A	Cluster B	Cluster C	Cluster D	Cluster E
Number of cluster members (n)	118	109	115	97	77
Meat from animals kept under more animal-friendly conditions is of better quality than meat from conventionally kept animals[2]	1.31[e]	1.32[e]	1.12[e]	1.33[e]	0.40[abcd]
Meat from animals kept under more animal-friendly conditions tastes better than meat from conventionally kept animals[2]	1.19[e]	1.18[e]	0.96[e]	1.14[e]	0.36[abcd]
Meat from animals kept under more animal-friendly conditions is healthier than meat from conventionally kept animals[2]	1.17[e]	1.15[e]	0.93[e]	1.25[e]	0.52[abcd]
Farm animal welfare crucially affects meat quality[2]	1.46[e]	1.51[e]	1.26[e]	1.45[e]	0.70[abcd]
A longer fattening period positively affects meat quality[2]	1.34[e]	1.28[e]	1.00[e]	1.46[e]	0.73[abcd]
Stress negatively affects meat quality[2]	1.45[e]	1.59[e]	1.28[e]	1.58[e]	0.78[abcd]

[1] Scale from +2= 'totally agree' to -2= 'totally disagree'; superscript letters indicate a significant difference with the corresponding cluster (Tamhane's T2 post hoc test).

[2] Variables are significant at $P \leq 0.001$.

In order to investigate the possible effects of different attitudes towards FAW and modern agriculture and to derive potential target groups for the purchase of AWPs, aspects of consumers' shopping behaviour as well as their willingness to pay a price premium for AWPs are analysed (Supplementary Table S4).

Overall, 42% of the consumers in our study state that they buy AWPs on a regular basis (μ=0.38; SD=1.04). Nevertheless, many consumers feel that finding more animal-friendly products in retail outlets is not easy (μ=-0.42; SD=0.989). For 44% of the respondents, FAW is the basis of their decision-making when buying products of animal origin (μ=0.39; SD=1.021) and 38.5% always think about how the animals were kept when buying products of animal origin (μ=0.25; SD=1.101). About 29% pay attention to the animal-friendly labelling of the products they buy (μ=0.03; SD=1.024). For nearly 30%, the price is always the basis of their shopping decisions (μ=-0.03; SD=1.089), and 48.4% agree that they would love to buy products from AWPs more often but find these products too expensive (μ=0.46; SD=1.061). Only 15.1% feel that the labelling provided informs them sufficiently about the production process, and nearly 38% are undecided about this statement (μ=-0.42; SD=0.989). Of the respondents, 37.8% agree or somewhat agree that animal welfare labels try to cheat the consumer (μ=0.31; SD=0.884), and only 22.9% trust animal welfare labels (μ=-0.13; SD=0.970). Overall, 76.6% are willing to pay a price premium for AWPs. On average, 23.1% of the consumers prefer shopping at the discounter, 51.2% mostly purchase food in the supermarket. Nearly 16% buy their meat from a butcher, 2.9% buy directly from a farmer and nearly 5% prefer buying food at the weekly farmers' market.

However, the high standard deviations clearly show that respondents' shopping behaviour is diverse and differs significantly among the five clusters.

Clusters A and B exhibit quite similar shopping behaviour, as members of both clusters regularly purchase AWPs and the level of FAW is the basis for their shopping decision. Members of cluster D also buy organic products on a regular basis. Furthermore, participants in cluster A more often think about how the animals were kept and, compared to the other clusters, animal welfare labels are most important to them. This cluster has the highest willingness to pay more for AWPs: 90% are willing to pay a price premium. Additionally, persons in cluster A buy their food at the supermarket disproportionally seldom but comparatively often buy meat from a butcher.

Even cluster B has a high willingness to pay more for AWPs (82.6%). However, they do not consider it easy to find more animal-friendly products. Furthermore, they feel the least well-informed by labels about the way the animals were kept. Compared to the other clusters, price is least important for these consumers, and they most often buy their meat from a butcher.

Clusters C, D and E all have diverse attitudes towards the purchase of AWPs. However, clusters C and D would love to buy more AWPs, but consider these products too expensive. Members of cluster D regularly buy products from more broadly defined quality programmes. Compared to the other clusters, cluster D respondents are particularly critical of labels and do not really trust them. Cluster E especially shows a comparatively low willingness to pay more for animal friendly products. Compared to the other clusters, members of this group, place the greatest importance on price.

5. Discussion

A variety of factors affects consumers' attitudes towards FAW and their actual shopping behaviour. This statement reflects the results of several prior studies that investigated various aspects of consumers' attitudes towards FAW or their purchase habits and willingness to pay a price premium for particularly animal friendly products (cf. Schulze *et al.,* 2008; Vanhonacker *et al.,* 2007). The present paper compiles the issues already taken into account in earlier studies and analyses them in a more comprehensive large-scale empirical study. The results confirm previous studies but also reveal new aspects of this highly relevant and frequently debated topic.

Overall, our study shows that consumers rate their own knowledge about agriculture rather low and are poorly informed about agricultural topics. The results, therefore, closely match the findings of other studies, which indicated overall low consumer involvement in agricultural topics (Busch *et al.,* 2013; Frewer *et al.,* 2005; Kanis *et al.,* 2003; Te Velde *et al.,* 2002; Vanhonacker *et al.,* 2010). However, nearly half the consumers we surveyed are generally interested in agricultural topics, confirming that large parts of society care about these issues (De Jonge and van Trijp, 2012; Harper and Henson, 2001; Vanhonacker and Verbeke, 2014). More than 36% regularly access information in the mass media about agriculture. Thus, our results in this regard are also in line with previous studies, suggesting that mass media constitutes the most important platform for consumers' information (TNS Emnid, 2012).

Large parts of consumers perceive current livestock production systems very critically. Our results indicate that there is even a negative trend for this issue. A European study from 2005 found that 77% of European consumers think that animal welfare standards should be enhanced (European Commission, 2005). In our sample, more than 88% of the respondents believe there is a need for higher animal welfare standards. Thus, within ten years, there has been an increase of more than 10 percentage points, putting the responsible stakeholders along the food supply chain under huge pressure to respond to these ever-growing consumer demands for improved husbandry conditions in livestock farming.

Consumers' criticism particularly focusses on large-scale farming, where a high number of animals is kept (Busch *et al.,* 2013; Heyder and Theuvsen, 2009; Kanis *et al.,* 2003; Kayser *et al.,* 2012a; Vanhonacker *et al.,* 2010). Our results confirm these earlier findings but also show that only 46.6% of consumers agree or somewhat agree that higher animal welfare standards can more easily be implemented on small farms. Many consumers are unsure about this statement. However, most of the respondents believe that animals feel more comfortable on small farms. The concept of small-scale farming with a modest number of animals kept per farm still seems to comply with consumers' idea of good animal welfare (Kayser *et al.,* 2012a). It can be assumed that this notion very much reflects the current public debate or idealized pictures provided by marketing campaigns, media coverage or other sources. However, contrary to the results of Busch *et al.* (2013), a clear relationship between involvement and criticism of large-scale farming was not observed in our sample. What could turn out to become a problem in the future is that investments in higher animal welfare standards are subject to considerable economies of scale, which clearly favours larger farms, whereas consumers prefer small-scale farming.

Furthermore, our results corroborate those of Busch *et al.* (2015), who showed that major parts of society do not trust farmers with regard to FAW. In this respect, too, consumers' evaluation has become increasingly more negative in the recent past. While Busch *et al.* (2015) found that 38% of German consumers think that farmers take good care of their animals, only 19% of the respondents in our sample agree or somewhat agree with this statement. This steep decline in the level of trust in farmers increasingly threatens producers' license to operate, that is, the social acceptance of their production processes and standards (Hiss, 2006).

Our findings also confirm those of Schröder and McEachern (2004), who showed that consumers often feel misled by labels. Our results suggest several reservations concerning labels and the information provided by them. Firstly, many people think that animal welfare labels try to cheat them, and consumers' trust in these labels tends to be low. Secondly, many people do not feel that the labels provide useful information. This loss of trust and the perceived information asymmetry have led to considerable purchase barriers for AWPs and prevent consumers from translating their concerns regarding FAW into appropriate shopping behaviour. In this way, the so-called citizen-consumer gap, which is often deplored by industry representatives from the agrifood sector, is further strengthened. Moreover, this severe loss of consumer trust increasingly restricts the options of the actors along the food supply chain when responding to consumer preferences, as efforts to improve animal welfare are not recognized as such by consumers. Currently, only 28% of consumers believe that the agricultural sector is honestly interested in the improvement of animal welfare standards.

The growing concerns and mistrust of consumers is also reflected in a relatively low social acceptance of meat consumption – an issue which has yet not been directly investigated in empirical studies. However, our results confirm those of other studies that showed many consumers question the legitimacy of conventional livestock production systems (Kauppinen *et al.,* 2010). Loss of trust and low social acceptance can both become starting points for reduced meat consumption, which has been observed in recent consumer studies (e.g. BMEL, 2016), and go hand-in-hand with a decrease in potential customers for AWPs (Spiller and Schulze, 2008).

This paper also evaluates consumers' perspective on the potential market effects of higher national animal welfare standards. Up to now, this aspect has not been investigated in other consumer studies. Our results show that considerable consumer segments see competitive disadvantages for farmers through enhanced national animal welfare standards. Thus, a certain understanding for farmers' economic constraints can be identified. However, the results of Busch *et al.* (2013) showed that this understanding does not always lead to changes regarding consumers' purchase habits. Nearly 30% of the respondents in our sample believe that products from more animal-friendly production systems will still remain a niche market in future.

The current study confirms previous results, which showed that consumers cannot be understood as one homogeneous group (e.g. Schulze *et al.,* 2008; Vanhonacker and Verbeke, 2014). Instead, it is possible to differentiate between five groups of consumers, which differ significantly according to their involvement, their attitudes towards FAW, the perceived social acceptance of meat consumption and the perceived market effects of higher animal welfare standards. These clusters also differ in the perceived relevance of higher animal welfare standards for other quality attributes and in their sociodemographics, lifestyle characteristics and shopping behaviour.

This study supports Vanhonacker and Verbeke (2009), who found that interested persons who attach high importance to ethical issues when buying animal-based food show a higher willingness to pay a price premium for AWPs. However, in our study, this relationship is not as clear as has sometimes been mentioned in previous studies (Schulze *et al.,* 2008; Vanhonacker *et al.,* 2007). While cluster B is only ordinarily interested in agricultural topics, members of this cluster have an above-average willingness to pay a price premium for AWPs and somewhat agree that they buy these products on a regular basis. Furthermore, these participants most often purchase organic products, which tend to be associated with higher animal welfare standards and characterized by high price premiums (Harper and Makatouni, 2002; Makatouni, 2002; Oekobarometer, 2010).

The findings by Kayser *et al.* (2012b) that persons with good knowledge are most critical of agricultural topics are not completely confirmed by our results. Clusters A and C are comparatively well-informed about agricultural topics. However, members of cluster C are somewhat unconcerned about FAW. The members of cluster D perceive their own knowledge about agriculture and animal production as comparatively low. Nevertheless, these persons are the most critical about the current living conditions in livestock production systems. This could indicate a trend that it is no longer only the well-informed who are critical about intensive livestock production but that this has become a social mega-trend in which many people participate regardless of their personal knowledge or educational status.

Furthermore, the connection between critical perception of conditions in current livestock production systems and consumers' actual willingness to pay a price premium for AWPs is not as clear-cut as mentioned in other studies (Schulze *et al.,* 2008; Vanhonacker *et al.,* 2007). Members of cluster D are most critical of the level of animal welfare in current livestock production systems; furthermore, members of this cluster evidence the strongest support for higher animal welfare standards. Nevertheless, cluster D shows only an ordinary willingness to pay more for particularly animal friendly products and does not clearly confirm buying these products regularly. Thus, these people may be the consumer group showing the greatest discrepancy between attitude and actual behaviour. This could be explained by the fact that these people attach comparatively high importance to product prices, maybe due to budget constraints, or experience other obstacles, such as lack of trust in labels, which prevents them from changing their buying behaviour.

Our study bears out the results of Schulze *et al.* (2008), who showed that persons who attach high importance to farm animals' opportunity to engage in natural innate behaviour are also willing to pay high prices for more animal-friendly products. Beyond this, our results suggest that these people also rate the health and the structural-technical equipment of barns as particularly important for animal welfare. The perceived importance of a good human-animal relationship did not affect the willingness to pay more in our study.

All the consumers we surveyed associate higher animal welfare standards with other quality attributes. These results strengthen previous studies showing that consumers often associate higher animal welfare standards with higher product quality (Meuwissen and van der Lans, 2004; Phan-Huy and Fawaz, 2003). Similar results were observed with regard to other quality attributes, such as organic (Wier and Calverley, 2002). However, the clusters differ significantly with regard to the strength they attribute to the relationship between animal welfare and other quality attributes.

Our results confirm those of other studies, which found that consumers' attitudes towards FAW are also influenced by sociodemographic and other personal characteristics. Our findings suggest that women are more attentive to animal welfare issues and are more willing to pay higher prices for AWPs. Thus, our results closely match the findings of earlier studies (Kehlbacher *et al.,* 2012; Makdisi and Marggraf, 2011; Nocella *et al.,* 2010; Schulze *et al.,* 2008; Vanhonacker and Verbeke, 2009). However, the relationship between other sociodemographic characteristics, including age, education, income or place of residence, and attitudes towards animal welfare or shopping habits is not as close as stated in earlier studies (Bennet and Blaney, 2002; Kehlbacher *et al.,* 2012; Makdisi and Marggraf, 2011; Nocella *et al.,* 2010; Schröder and Mc Eachern, 2004; Schulze *et al.,* 2008; Vanhonacker *et al.,* 2010; Vanhonacker and Verbeke, 2009). Even the literature indicates that the relationship between sociodemographic characteristics, on the one hand, and consumers' attitudes and animal welfare-orientated shopping behaviour, on the other, considerably differs among studies. Several researchers have already expressed doubts concerning the usefulness of these variables to explain consumers' shopping behaviour (Dagevos, 2005; Diamantopoulos *et al.,* 2003, Pouta *et al.,* 2010). Furthermore, Vanhonacker *et al.* (2009) and Toma *et al.* (2012) found that attitudes towards animal welfare are much more strongly influenced by individual experiences, involvement in agricultural practices and other lifestyle characteristics. Our results indicate that these findings also apply for our sample.

Like most non-experimental studies, ours has some limitations that need to be taken into account when interpreting the results. Firstly, the aided nature of our variables could affect the response behaviour of the survey participants. Heise and Theuvsen (2015) and Heise *et al.* (2015) clearly showed that different methodological approaches (qualitative vs quantitative) lead to considerable differences in farmers' and veterinarians' definition of farm animal welfare. A similar pattern might also exist among consumers. Due to effects of social desirability, participants' answers might not always honestly reflect their personal opinions but also include social expectations from an ethical and moral perspective. This might lead to biased answers. Secondly, from previous studies we already know that attitude-behaviour discrepancies are existent among consumers (Coff *et al.,* 2008; Harvey and Hubbard, 2013; Vanhonacker *et al.*, 2010). These discrepancies may result in an overestimation of the market potential for more animal-friendly products as positive attitudes and the indicated willingness to buy these products do not always lead to a corresponding behaviour when buying products of animal origin.

6. Marketing implications

The different attitudes towards agriculture and animal welfare as well as the diverse sociodemographic characteristics and shopping habits indicate that consumers have distinctive profiles. According to Verbeke (2009), appropriate market segmentation could help to address this heterogeneity in consumer demand and to transfer consumers' concerns and their expectations concerning FAW into corresponding shopping behaviour. Programmes that are differentiated in terms of animal welfare level and the price premiums it entails could, therefore, lead to a broader segment for AWPs and enable consumers to make product choices according to their individual preferences (De Jonge and van Trijp, 2012).

Four of the clusters identified (the 'interested animal welfare friends', the 'uninformed animal welfare friends', the 'market-conscious animal welfare proponents' and the 'critical proponents of animal welfare on small farms') generally favour the enhancement of FAW standards. Clusters A and B already regularly buy products from more animal-friendly production systems and, thus, currently constitute the most important target groups for AWPs. Clusters C and D would prefer to buy AWPs more frequently, but high prices currently prevent them from purchasing these products. Nevertheless, these groups constitute potential initial target groups for the purchase of more animal friendly products. At the same time, they represent a need for innovations that will make it possible to provide higher animal welfare standards at lower costs. Even cluster E, the 'uninvolved', could potentially become a target group, as they do not oppose the improving the animal welfare level. However, preferences and attitudes are said to be relatively stable and durable cognitive orientations (Weber *et al.,* 2005). Therefore, it is very likely that there are mobility barriers between the individual clusters and that consumers will remain in the same group for the long term. For that reason, specific marketing implications should be derived for each cluster.

Members of cluster A most often buy more animal-friendly products and show the highest willingness to pay for these products. Cluster A is the group that is most involved in agricultural topics. Retailers should use the interest of these persons to advertise precisely defined product segments to these consumers. Mass media should be included for advertising campaigns, as this is consumers' main source of information. Furthermore, improvements concerning animal health, the structural-technical equipment of barns and animals' opportunity to engage in natural innate behaviour should be particularly highlighted, as these aspects are quite important to cluster A. An above average number of the individuals in cluster A are women with a comparatively low frequency of meat consumption who are responsible for the household. Furthermore, the overall social acceptance of meat consumption is strongly questioned by this sub-group. To avoid even more members of this cluster further reducing their meat consumption, AWPs with standards significantly above legal requirements should be implemented and placed on the market. As these persons comparatively often buy their meat from a butcher, butcher shops and fresh meat counters in the supermarkets should provide products tailored to the needs of this sub-segment.

Members of cluster B also buy AWPs on a regular basis and show an above average willingness to pay for these products. They also place the highest trust in labels. This is the only other cluster that buys organic animal-based products on a regular basis. Furthermore, the price is least important to cluster B members since they report the highest net income per month. Members of cluster B also have the highest education level, but are generally not responsible for the household. Thus, employed high earners characterize this cluster. As this cluster indicates a high social acceptance of meat consumption and an above-average share of members who eat meat, it constitutes a very attractive target group for high-priced AWPs. However, working people often have only limited time for grocery shopping, and this group of people most often agreed that animal-friendly products are not easy to find at the supermarket. Lack of time to shop and the perceived low availability of specific AWPs could lead to the purchase of organic products, which are much easier to find in retail and are often associated with higher animal welfare standards (Harper and Makatouni, 2002; Makatouni, 2002; Oekobarometer, 2010). To preserve this consumer group specifically for the market segment of AWPs, prime importance should be given to the practical applicability. Retail must ensure that labelling is clear and easy to recognize and that AWPs are easily available in the markets. As these individuals most often buy their meat from a butcher, the market segment for high-priced AWPs should be extended to this shopping location.

Cluster C is characterized by average involvement in agricultural topics and moderate attitudes towards FAW and animal welfare standards. Members of cluster C do not associate animal welfare with small farms. Furthermore, members of cluster C have the highest social acceptance of meat consumption and most often eat meat. For this reason, they constitute an attractive target group for the meat market. Currently, these individuals seldom purchase AWPs but would like to buy them more often. So far, the high price constitutes a shopping barrier for this cluster. For this reason, this cluster constitutes a target group for a middle segment in the market for more animal-friendly products in which products are priced slightly to moderately above

standard goods. As mentioned before, this may require process innovations to make it possible to provide AWPs at moderate prices. Mass media could be used to communicate the improvements concerning animal welfare to this cluster, as these persons most often use the media to inform themselves about agricultural topics.

Cluster D reports comparatively little involvement in agricultural topics but rates the current conditions of FAW most critically. Furthermore, members of cluster D most strongly agree that animal welfare standards should be enhanced. They currently do not purchase AWPs on a regular basis. Nevertheless, members of cluster D report that they would like to buy more animal-friendly products but find these products too expensive. Furthermore, cluster D sees comparatively strong relationships between animal welfare standards and other quality attributes like taste or healthfulness. Moreover, these persons report buying products from quality assurance programmes on a regular basis. Thus, cluster D is an appropriate target group for products from more broadly defined quality assurance programmes that include higher animal welfare standards as an additional benefit in addition to other quality attributes, such as better taste. Even a relatively low-priced market segment of specific AWPs could provide a suitable range of products for these consumers. Furthermore, cluster D prefers animal production on small farms. Thus, programmes supporting small-scale agriculture could also be attractive for these people. As members of cluster D most strongly mistrust labels, transparent communication strategies should be implemented to avoid information asymmetries and gain the trust of this consumer group. As many young people who are still at school or in apprenticeship are in cluster D, this group of persons prospectively constitutes a very important future target group for the retail sector.

Cluster E, the 'uninvolved', are the only sub-group that does not clearly favour higher animal welfare standards. Their attitudes towards FAW and meat consumption and towards the relationship between animal welfare and other quality attributes are diverse and often undecided, with most statements in the zero range. Thus, these people do not have a pronounced opinion about FAW. Moreover, this sub-group reports below average willingness to pay for AWPs. Furthermore, they currently do not regularly buy AWPs or show an interest in buying them more often in future. Thus, members of cluster E currently do not constitute an interesting target group for AWPs. As this cluster is the smallest, with only 77 participants, specifying a market segment or targeting marketing campaigns for this group does not seem useful at the moment.

Despite the target group-specific implications, responsible persons from retail should in general try to reduce consumers' purchase barriers for AWPs in order to decrease the discrepancy between consumers' attitudes and their actual shopping behaviour. Animal welfare is a credence attribute to consumers. Thus, they are crucially dependent on appropriate information about the conditions under which animals were kept (Lagerkvist and Hess, 2010). Beyond this, consumers' lack of trust could be decreased through the reduction of information asymmetries. Transparency and trustworthiness during the entire production process should be ensured in order to gain the trust of the wider public. Furthermore, retailers should guarantee easy availability of AWPs. If consumers cannot find the products they prefer, they are easily frustrated and feel powerless to influence the level of FAW (Schröder and McEachern, 2004).

The overall alienation of consumers from agricultural production leads to low consumer involvement in agricultural topics. Targeted advertising in the media could counteract the mostly negative headlines about agriculture and food production in general in the recent past (Kayser, 2012). Furthermore, transparency campaigns from the agricultural sector, like guided visits to farms and livestock barns could help consumers acquire a more accurate impression of modern agriculture (Windhorst, 2016).

High additional costs constitute massive hurdles for large numbers of consumers, especially if additional benefits from buying these products remain unclear (Enneking, 2004). In Germany, an industry solution has been established whereby retailers temporarily bear the additional costs of higher animal welfare standards. In this way, consumers do not bear the initial brunt of higher prices, and a broad market segment for meat with higher animal welfare standards is created. The long-term aim is to shift the additional costs little by little to consumers. Kahneman and Tversky (1979) showed that it is more important to individuals to avoid the 'bad' than to gain the 'good'. Therefore, improvements in FAW have to be clearly communicated to

consumers, allowing them to become used to the higher level of animal welfare and, after a while, to perceive the higher level as new standard. Thus, even consumers with low animal welfare preferences could develop a certain willingness to pay a price premium rather than fall back to the lower standards, which no longer meet their adjusted expectations.

7. Concluding remarks

Consumers' attitudes towards agriculture and FAW and the effects on their shopping behaviour have been widely studied in recent decades (e.g. Schulze *et al.,* 2008; Vanhonacker and Verbeke, 2014). We used this information as a starting point for a comprehensive and representative empirical study and added new aspects that had not been investigated before. It was the aim of the present study to find different consumer groups that differ in their attitudes and their shopping behaviour and to derive target groups for AWPs. This goal was achieved by grouping the consumers into five clusters according to their involvement in agricultural topics, their attitudes towards FAW and their social acceptance of meat consumption. These clusters also differ with regard to their sociodemographics and other lifestyle characteristics, their perception of the relationship between FAW and other quality attributes and their shopping behaviour. Based on our results, we derived specific marketing implications for each cluster. These implications can help develop a more differentiated market segment for AWPs in terms of animal welfare level and required price premium, enabling consumers to make product choices according to their preferences (De Jonge and van Trijp, 2012). In this way, a broader market segment for AWPs can be established, the overall level of animal welfare in livestock production can be enhanced and the demands of large segments of society can be met. This can help to counteract the overall low reputation of the agricultural sector and regain consumer trust in agricultural production and the information provided by such means as labels.

However, the long-term success of animal welfare concepts is not determined only by consumers' attitudes and behaviour but also by the acceptance of other stakeholders along the supply chain and their willingness to participate (Deimel *et al.,* 2010; Franz *et al.,* 2010; Golan *et al.,* 2000; Gulbrandsen, 2006). Future studies should consider this aspect and investigate in greater depth the attitudes of various stakeholders along the meat supply chain towards FAW and specific animal welfare criteria. As an initial step, these studies could analyse the importance of different animal welfare criteria for different stakeholders. Next, the practical applicability of these criteria could also be analysed from different points of view. These results could help develop animal welfare concepts that are accepted by all stakeholders and effectively enhance the level of animal welfare.

Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2016.0115.

Table S1. Sample composition compared to basic population in Germany.
Table S2. Results of the cluster analysis.
Table S3. Personal characteristics and lifestyle habits of the respondents.
Table S4. Purchase behaviour of the consumers.

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