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Consumer Attitudes in Germany towards Different Dairy Housing Systems and Their Implications for the Marketing of Pasture Raised Milk

Ramona Weinrich[ⓘa], Sarah Kühl[b], Anke Zühlsdorf[c], and Achim Spiller[d]

[a]*Research Assistant, Georg-August-University Goettingen, Department of Agricultural Economics and Rural Development, Chair Marketing for Food and Agricultural Products, Platz der Göttinger Sieben 5, 37073 Göttingen, Germany*

[b]*Research Assistant, Georg-August-University Goettingen, Department of Agricultural Economics and Rural Development, Chair Marketing for Food and Agricultural Products, Platz der Göttinger Sieben 5, 37073 Göttingen, Germany*

[c]*Consultant, Agrifood Consulting GmbH, Weender Landstraße 6, 37073 Göttingen, Germany*

[d]*Professor, Georg-August-University Goettingen, Department of Agricultural Economics and Rural Development, Chair Marketing for Food and Agricultural Products, Platz der Göttinger Sieben 5, 37073 Göttingen, Germany*

Abstract

There is currently much debate surrounding the housing systems for dairy cattle. Large farms, which represent a growing share of the dairy farms, prefer indoor housing systems whereas smaller farms concentrate on low-input systems by giving extended pasture access to milk cows. A consumer survey from 2013 with 1,009 German consumers dealt with consumers' attitudes towards outdoor and indoor systems as well as quality aspects of food. A factor and a cluster analysis are used to reduce the complexity and identify different consumer clusters. The results give recommendations for farmers, constructors of animal sheds, agricultural technology and the processing dairy industry concerning strategic decisions.

Keywords: Housing systems, dairy cattle, pasturing, consumer research, cluster analysis

ⓘCorresponding author: Tel: +49 551 39 19534
Email: R.A. Weinrich: rweinri@gwdg.de
S. Kühl: sarah.kuehl@agr.uni-goettingen.de
A. Zühlsdorf: azu@agrifood-consulting.de
A. Spiller: a.spiller@agr.uni-goettingen.de

Introduction

There is currently much debate surrounding housing systems for dairy cattle. At one end of the spectrum there are the purely indoor housing systems where cows are fed mainly with concentrated feed and that aim to maximize milk production per cow (high-output). At the other end of the spectrum there are cost-minimizing systems that focus on pasture-grazing (low-input) (Steinwidder et al. 2009; Baur et al. 2010). In addition, there are systems that combine free-range and fully housed systems: e.g., housed systems with principally concentrated feed but with access to an outdoor area or systems where cows are at pasture for at least some hours in the summer and have the opportunity of grazing as well as being provided with concentrated feed (Brade 2012). Each system has its advantages and can be cost efficient. This depends on various conditions, such as consolidated pasture, land costs or legal requirements. As a consequence, the focus of the different housing systems differs between countries: e.g., Sweden has regulations for dairy farms that require cows to have access to pasture for at least six hours per day in summer (Spörndly 2012). In countries like Ireland, much grassland is available so outdoor systems with grazing is the obvious choice (Laepple et al. 2012).

Besides some other North-western European countries like the Netherlands, Belgium, or Denmark, Germany is an example for a country with no legal regulations for dairy cow pasturing and an environment which allows different dairy systems. In Germany, the structure of the dairy farms has changed over the last decades. The number of dairy farms has decreased, whereas herd sizes have grown (Federal Statistical Office 2011). Due to the increasing number of cows per farm, the challenges of grazing in Germany are rising. If the farmer wishes to offer free-range for cows, the size of the pastureland has to be proportional to the increased number of cows. But not every farm has the possibility of obtaining more pastureland as the herd size grows (Ostermann-Pfalz and Stöcker 2013). In this case, farmers may opt for a fully housed system where it is possible to enlarge herd size and improve economies of scale. Genetic predisposition also needs to be taken into account as most breeds are bred for high milk performance and so require concentrated feed to achieve the required performance. When they are fully housed it is easier to provide the required feed. Another limiting factor is the workload involved in having to drive the cows to pasture that is far-removed from the farm, as a result of the insufficient number of contiguous parcels (Schleyer et al. 2013). Against these factors, Reijs et al. (2013) predict a decline in German dairy farms with pasturing for cows (regardless of the length of time of pasturing) from almost 50 % in 2012 to less than 5 % in 2025 leading to a new debate in the general public about animal welfare and product quality.

The Dairy Industry from the Consumer Viewpoint

The fact that dairy cattle are visible is also important for the public's collective understanding of dairy farming and seems to have a positive influence on its image. At the very least, the image of the dairy industry is not as negative as the image of the meat industry (Schleyer et al. 2013). Several studies show that consumers generally prefer pasturing or at least an access to pasture for animals. Access to open-air is an important criterion for most consumers (Fearne and Lavelle 1996; Deimel et al. 2012). This factor could have an influence on the image of farming systems as well as on the food processing sector. How crucial public perception of a sector is can be seen in the case of battery cages for laying hens. The media debate and corresponding pictures

regarding the keeping of laying hens in cages supports the consumer preference for free-range. Pressure from consumers is the reason why eggs from battery hens are now outlawed in Germany (Hörning 2009).

Nevertheless, as shown in the introduction, there is an opposing trend in the German dairy system towards housed dairy cow systems while from a social perspective pasturing should be maintained. On account of these antagonistic requirements, this paper focuses on the German market and consumer perception in Germany. No specific research has been carried out regarding approval of free-range systems (particularly not for the dairy sector). It thus seems very important to obtain deeper insights into consumer attitudes towards the different housing systems so as to avoid situations akin to that of the egg market.

Initial indications that consumers prefer pasture-based systems for dairy cattle is shown by the market share of over 20 % in Denmark for milk which is advertised as pasture-raised milk (Heerwagen et al. 2013). Preliminary efforts are being made to launch pasture-raised milk in Germany. In other countries like the Netherlands (FrieslandCampina), Switzerland (Mirgros), USA (Sweet Meadows Farms) and, as mentioned above, Denmark (Arla Foods), premium products have already been established with the term “pasture” or “meadow” so that higher prices for pasture-raised milk can create an incentive for farmers to continue using pasture-based systems. Moreover, some studies have shown that there is a consumer segment that is willing to pay more for milk from cows that have access to pasture (e.g. Pirog 2004 [USA], Ellis et al. 2009 [UK], Hellberg-Bahr et al. 2012 [GER]). Concern for animal welfare (Ellis et al. 2009) and environmental aspects are identified as major reasons for buying pasture-raised milk, as well as the expectation of a healthier product (Hellberg-Bahr et al. 2012).

In general, quality considerations are important purchasing motivations for some consumers (Caswell and Joseph 2008). The food choice decisions that consumers currently face are already very complex and include a wide variety of situational (e.g. time, price), egoistic (e.g. taste, health) and altruistic (e.g. environmental protection, animal welfare) motivations (e.g. Caswell and Joseph 2008; Tsakiridou et al. 2007). In their review Aertsens et al. (2009) describe the personal determinants of organic food consumption. These are actually more abstract values such as “safety”, “hedonism”, “universalism”, “benevolence”, “stimulation”, “self-direction” and “conformity”. As well as attitude, subjective and personal as well as (perceived) behavioural norms influence the consumption of organic food. Today, milk and milk products are increasingly advertised with additional features for product differentiation. In Germany, the main focus is on GMO freeness, fair payment for dairy farmers, regional origin and the quality attributes of organic milk (Bickel et al. 2009; Zander and Hamm 2010). Environmental and animal welfare characteristics are also important to consumers (Zander and Hamm 2010). McGarry Wolf et al. (2009) showed that the purchasing interest for milk in American organic buyers centered around the qualities of fresh and aromatic taste, safety, high quality, healthy and high nutritional quality, a proper price-quality ratio and a subjectively appropriate price. Many of these aspects can be found in pasture-raised milk. However, pasture-raised milk is based on credence attributes (Akerlof 1970), as consumers must rely on the message that dairy cows have had access to pasture. The marketer therefore needs to provide a sign of reliability.

Although some consumers may show positive attitudes towards pasturing or the furthering of animal welfare issues, a higher price might still be a barrier to purchasing these products (McEachern and Schröder 2002; Padel and Foster 2005; Plaßmann and Hamm 2009). This phenomenon could be explained by the theory of the consumer-citizen-gap. This describes the gap between the attitudes of citizens and their actual behaviour as customers in their shopping situations (especially in respect to animal welfare aspects in food) (Coff et al. 2008; Harvey and Hubbard 2013). While citizens may state that they support pasturing, they may fail to follow through with it in their purchasing as consumers. This has already been shown with the organic food market: Pearson et al. (2011) come to the conclusion that a gap exists between positive attitude and actual behaviour when it comes to making decisions between organic and conventional foods.

This leads to the conclusion that, as well as analysing attitudes toward fully housed and pasturing systems, the survey presented in this paper should integrate the quality orientation of consumers, often related to a high involvement in the product. These consumers are thus more willing to purchase premium products (Aertsens et al. 2009). The assumption of this paper is therefore that there are consumers who prefer pasturing and who are also willing to purchase pasture-raised milk, since they are interested in quality. However, at the same time, there are people that, although they may prefer free-range systems as citizens, as consumers they block it out and so do not consider whether the milk originates from pasturing or from fully-housed systems; it is here that the consumer-citizen-gap is present.

In order to integrate the theory of the consumer-citizen-gap found in this literature, this analysis includes the quality aspect. The evidence encourages further research to be undertaken involving the separation of consumers according to their purchasing behaviour for foods, especially milk. This is of particular interest to the German market given the current small market share for pasture-raised products.

Goals

All the studies presented in the last section focus on whether consumers would purchase pasture-raised milk, on willingness to pay (WTP) analyses or the general preferences of consumers for free-range in livestock farming. The difference in housing systems is not the focal point in this research, or is not even included. What is important is learning more about attitudes towards housing systems and food quality for the purposes of strategic decision-making in the industry concerned.

This paper contributes important background information regarding the perception of housing systems. Due to the issues presented above, regarding decline in pasturing, consumer preference for free-range systems and quality as buying motives, the following three research questions shall be answered:

- How important is pasturing for consumers?
- What is the image of fully housed systems?
- Can the existence of the consumer-citizen-gap regarding quality be verified by different clusters?

It is important for farmers, agricultural technicians and animal shed builders to have this information, so they can be prepared for a possible development regarding consumer expectations. The following factor and cluster analysis have the advantage of combining consumer attitudes towards housed and outdoor systems, while simultaneously separating consumers into different groups depending on their quality orientation. The market potential for pasture-raised milk and further manufactured products can thus be established. The results also lead to recommendations for strategic decision-making in the long run. The results are especially important for dairies and the dairy processing industry regarding their long-term business development.

Methodology

The data collection took place in July 2013 via an online access panel. The sample size was 1,009. To obtain representative results for the German population, quotas were set for age, gender, education and regional distribution. The survey consisted of questions on milk purchasing frequency as well as the relevance of milk production and milk quality. The focus was on animal welfare aspects of pasture and indoor systems. Respondents scored their answers on a five-point Likert scale. The data was analysed using the statistical software IBM® SPSS, version 21.

First, descriptive analyses showed the impression of consumers when prompted with images of indoor and outdoor systems. The association was measured by a semantic differential. One set of questions showed three images of modern indoor housing systems and another set displayed cows at pasture. Both sets were randomly presented in order to prevent sequence effects. Next, an explorative factor analysis was used to reduce complexity. Finally, a cluster analysis was conducted for the purpose of identifying different consumer clusters. The cluster analysis was performed in several steps to optimize results. Ward's method was used as a cluster method, and the squared Euclidean distance as an interval measure. K-means clustering was conducted to refine the solution. A discriminant analysis verified the goodness of separation of the K-means algorithm. An analysis of variance (ANOVA) was used to describe the clusters. Post-hoc tests were used to determine significant differences between the means of the ANOVA. Finally, cross tables identified the socio-demographical differences between the resulting clusters.

Results

Due to the quotas set, the survey approximately represents the German population. Average age is 41 years, 49.4 % are male and 50.6 % are female. Regional distribution and education levels correspond with the German population. 29.9 % of the respondents have a net household income of less than € 1,500 per month, 28.4 % have between € 1,500 and € 2,500 per month and 24 % have € 2,500 or more per month. 17.9 % did not specify. Table 1 shows the percentage share in relation to the sample and its given distribution in the German population.

Table 1. Sample characterization

Variable	Description	Frequency (%) Sample	Frequency (%) Germany[1]
Age	16 to 30	26.1	24.8
	31 to 50	42.8	41.2
	Older than 50	31.4	34
Gender	Male	49.4	49.6
	Female	50.6	50.4
Region	North	15.8	15.9
	South	27.5	28
	East	20.7	20.5
	West	36.1	35.6
Education level	No qualification	5.2	7.8
	Primary school	40.2	36.6
	Secondary school	28.2	28.8
	A-level	13.0	13.6
	University or vocational qualification	13.4	13.2
Net household income	Less than 1,500	29.9	-
	1,500-2,500	28.4	-
	More than 2,500	24.0	-
	n. s.	15.7	0.4

Source. Authors' calculation; Federal Statistical Office (2012)

First of all, the respondents were asked to provide their semantic association to images of cows by means of a semantic differential (Figure 1 and Figure 2). The pictures were taken from typical farms and discussed with experts from the industry. Especially the indoor system is presented with images coming from newly built and modern farms using cubicle housing systems.

Figure 1. Presented pictures of housed system

[1] Quota of the German population solely for the purposes of showing the quota (age, gender and region) used to build the sample

Figure 2. Images presented of outdoor systems

Tables 2 and 3 show higher mean values for positively connoted words, connected with images of outdoor systems. As Tables 2 and 3 illustrate, the housed system evoked more negative connotations than did the images of the dairy cows outdoors.

Table 2. Semantic differential for fully housed systems (answers in %)

	Very (2)	**Slightly (1)**	**Partly / partly (0)**	**Slightly (-1)**	**Very (-2)**		**Mean value**
Animal friendly	9.2	10.9	28.2	25.9	25.9	Cruel towards -animals	-0.48
Healthy	10.4	15.9	35.6	20.1	18.1	Unhealthy	-0.20
Traditional	11.0	14.4	22.8	20.1	31.8	Industrial	-0.47
Modern	26.2	30.4	28.0	7.1	8.3	Old-fashioned	0.59
Environmentally -friendly	9.1	14.3	41.2	20.6	14.8	Environmentally -harmful	-0.18
Caring	7.4	10.3	25.0	27.1	30.1	Loveless	-0.62
Close to nature	6.9	7.6	20.6	24.9	40.0	Unnatural	-0.84
n = 995-1,003							

Table 3. Semantic differential for outdoor systems (answers in %)

	Very (2)	**Slightly (1)**	**Partly / partly (0)**	**Slightly (-1)**	**Very (-2)**		**Mean value**
Animal friendly	70.4	17.2	10.0	1.8	0.6	Cruel towards animals	1.55
Healthy	65.6	21.6	11.3	1.0	0.6	Unhealthy	1.5
Traditional	65.2	21.6	10.3	2.1	0.9	Industrial	1.48
Modern	27.5	21.4	34.6	12.5	4.0	Old-fashioned	0.56
Environmentally -friendly	56.0	25.7	14.9	2.7	0.7	Environmentally -harmful	1.34
Caring	54.7	26.9	15.4	2.2	0.8	Loveless	1.32
Close to nature	74.2	15.2	8.9	0.9	0.8	Unnatural	1.61
n = 999-1,004							

In a second step, attitudes towards the different systems were evaluated using likert scale questions, resulting in a factor analysis. According to the Kaiser-Meyer-Olkin criterion, the result of the factor analysis is excellent (KMO = 0.929; Kaiser 1974). Bartlett's test of sphericity is highly significant, which demonstrates that the variables are highly correlated (Backhaus et al. 2006). The survey had several goals. As the aim was to identify consumers' attitudes concerning fully housed systems and outdoor systems, the first two factors from Table 4 were chosen. As the third factor pertains to the consumer-citizen-gap, it was chosen as well. Thus, only the first three out of the resulting six factors in Table 4 entered the cluster analysis as the focal point. Adding the other factors to the cluster analysis might also have resulted in clusters being too complex. It

is these three factors that are presented hereafter. The first factor includes eight items regarding pasture-raised milk. It is thus named pro pasturing. The second factor combines seven items that support fully housed systems and is thus named pro fully-housed systems. The third factor includes seven items regarding attitudes towards quality. Items loading on this factor refer to regional milk purchase, WTP for known brands, purchase of organic milk as well as environmentally-friendly and animal-friendly production standards, in addition to the items "Healthy nutrition is important to me" and "I like to try new things". All items and factor loadings are outlined in detail in Table 4.

Table 4. Results of the factor analysis

Factors and Items	**Factor Loadings**
Pro pasturing (Cronbach's Alpha = 0.918; % of variance = 17.950)	
Pasture grass is important for the good nutrition of animals.	0.847
Outdoor exercise in the fresh air is important to make the animals feel comfortable.	0.826
Pasture is important for our natural environment.	0.802
Dairy cows at pasture are important in our agricultural landscape.	0.799
Dairy cows need outdoor exercise in the fresh air.	0.745
Fresh grass as feed makes animals healthier.	0.744
For me, pasturing is the most natural form of dairy farming.	0.681
I cannot imagine an agricultural landscape without grazing cows.	0.666
Pro fully housed systems (Cronbach's Alpha = 0.833; % of variance = 11.994)	
Dairy cows in indoor systems are better looked after.	0.799
Animal illness will be noticed faster in indoor systems.	0.746
Dairy cows in indoor systems can be fed according to requirements.	0.741
Dairy cows in indoor systems are better protected against heat and cold.	0.735
Dairy cows in indoor systems produce more milk and are therefore more climate-friendly.	0.655
Milk can be produced more cost-effectively in indoor systems.	0.631
I can understand that farmers these days do not want to push dairy cows onto pasturage every day.	0.445
Quality orientation (Cronbach's Alpha = 0.809; % of variance = 9.959)	
While shopping I try to look out for products that were produced in an environmentally-friendly way.	0.703
While shopping I try to look out for products that were produced in an animal-friendly way.	0.689
I mostly buy organic milk.	0.680
For known brands, I would definitely pay a surcharge.	0.609
I prefer buying milk from my region.	0.565
Healthy nutrition is important to me.	0.556
I like to try new things.	0.519
Dairy company policy (Cronbach's Alpha = 0.898; % of explained variance = 9.288)	
The dairy farm behaves in an environmentally-conscious way.	0.814
The milk is from species-appropriate livestock farming.	0.809
Fair milk prices for farmers in Germany.	0.796
Milk in its natural state.	0.710
Pragmatism (Cronbach's Alpha = 0.746; % of explained variance = 6.971)	
If indoor housing means cheaper milk, it suits me.	0.670
I have to do my shopping fast; I don't look out for differences in milk.	0.655
I especially look out for low-priced milk prices.	0.645
If the cows are well, indoor housing is fine.	0.538
If modern cowsheds provide animals with plenty of exercise and fresh air, that is completely fine.	0.508
Animal Welfare (Cronbach's Alpha = 0.644 % of explained variance = 4.624)	
I cannot imagine that cows that are living only in a barn can feel well.	0.669
For me, keeping cows indoors year-round is cruelty to animals.	0.653
KMO (Kaiser-Meyer-Olkin) = 0.929; explained total variance = 60.79 % Bartlett-Test for sphericity = 16,946.484; significance = 0.000 n = 1,009	

Based on Ward's method, scree tests, a dendrogram and other practical considerations, a four-cluster solution was decided upon. K-means gave F values for all the cluster-forming variables that were significant at the 1 % level, suggesting that the clusters were homogeneous. The average value for Eta is 0.726, showing that there are significant differences between the cluster-forming factors and that the variance within the clusters, is negligible. Eta-squared is 0.529; therefore, 52.9 % of the variance within the cluster-forming factors can be attributed to differences between the clusters. 96.8 % of the cases were attributed to the same clusters by both K-means and discriminant analysis. Table 5 (see Appendix) contains the detailed results of the cluster analysis.

The four clusters can be characterized as follows: The first cluster is the second largest, with a total of 281 consumers. It has high mean values for the pro pasturing and quality orientation factors, whereas the pro fully housed systems factor has a negative mean value. This is therefore the "quality-conscious" cluster. The second cluster is the smallest one. It has no high values for any factor mean value. Therefore, it could be characterized as the "undecided" cluster. The third cluster has a size of 257 respondents. These consumers are less quality-orientated, but show positive values for the pro pasturing and pro fully housed systems factors. This cluster is named the "generalists". The fourth cluster is the largest one. It has a high value for the pro pasturing factor, but lower values for the pro fully housed systems and quality orientation factors. This is therefore the "pasture-supporters" cluster.

The results illustrate that clusters 1, 3, and 4 have the highest mean values for the pro pasturing factor. Since the third cluster also has a high score for the pro fully housed systems factor, this cluster is a less optimal target group for pasture-raised milk. The quality orientation factor is an important aspect for consumers in the first cluster, whereas consumers in the fourth cluster have less interest in the quality characteristics of the products. This difference could be explained by socio-demographic relationships. Whereas the first cluster contains significantly more women and more consumers with a higher education level, cluster number four is overrepresented by consumers from the lower income classes. This group also has significantly more consumers with only a secondary school education and significantly less with a university degree.

To discover whether the theory of the consumer-citizen-gap can be verified, the WTP for pasture-raised milk was requested in the survey. The respondents were asked to imagine that they were in front of a supermarket shelf. They saw four realistic offers of milk with the corresponding realistic prices, as follows: private label (€ 0.65), milk brand one (€ 0.95), organic milk (€ 1.05), milk brand two (€ 1.25). The respondents were also shown a product dummy of pasture-raised milk. Then, they were requested to state their WTP for 1 litre pasture-raised milk. Outliers stating a WTP more than 30 % of the average WTP or less than 30 % of the average WTP were removed from the WTP calculation.

On average a WTP of € 1.04 was stated. The WTP for 1 litre of pasture-raised milk was also calculated for each different cluster and compared to reference prices. The result for the first cluster is a WTP of € 1.13, for the second € 0.98 and respondents of the third and fourth cluster each stated a WTP of € 1.01 for 1 litre of pasture-raised milk. The WTP of the first cluster is significantly higher than the WTP of the other clusters. Table 6 below gives an overview of the WTP for the four clusters.

Table 6. Results of the calculated WTP

WTP for Cluster 1	WTP for Cluster 2	WTP for Cluster 3	WTP for Cluster 4
€ 1.13	€ 0.98	€ 1.01	€ 1.01

Discussion

The literature shows that there is a gap between the rising number of large farms that prefer housed systems for dairy cattle (Schleyer et al. 2013) and customers who demand milk from cows with access to pasture (Ellis et al. 2009; WSPA 2010). The survey presented reveals that consumers differ in their attitudes towards the different housing systems and in their quality orientation. As this was an approximately representative sample, the results can be transferred to the German population.

The semantic differential clearly gives an initial indication that free range systems have positive connotations whereas images of indoor systems evoke more negative emotions. A reason for that might be that grazing cows are firmly anchored images. As known in the literature, pictures can be recollected better than words (e.g. Paivio and Csapo 1973; Graber 1996). The factor analysis confirms a separated perception of housed and outdoor systems, by items loading on two different factors (pro fully housed system / pro pasturing). The positive associations of pasturing are therefore separate from the negative associations of a fully housed system. The items loading on the factor pro fully housed system are perceived primarily as technical advantages by farmers, as opposed to the emotional items loading on the factor pro pasturing.

A particularly suitable target group for pasture-raised milk is the first cluster of quality-conscious participants with a high education level, but the value attached to pasturing by the fourth cluster also makes it a suitable candidate. Both clusters demonstrate high levels of agreement with statements concerning cows having access to pasture and fresh air. They also both agree that they wish to retain dairy cattle in the landscape.

There are, however, clear differences between the clusters regarding quality aspects. For the first cluster respondents it is important to know where the milk they purchase comes from. They have the highest agreement levels to the statements “While shopping I try to look out for products that were produced in an environmentally-friendly way.” ($\mu = 1.34$) and “While shopping I try to look out for products that were produced in an animal-friendly way.” ($\mu = 1.38$). These two statements are less distinctive for the fourth cluster ($\mu = 0.06$ and $\mu = 0.21$). Quality orientation is generally not an important aspect for pasture-supporters ($\mu = -0.15$). This might be due to the fact that the fourth cluster has significantly more respondents with a lower education level and also a significantly higher proportion of respondents distributed across the two lowest income classes. Pasturing might be a very important aspect to these consumers, but when out shopping they pay less attention to food quality aspects. Price might be more important for this group as they show a lower WTP than the quality-conscious cluster. The first cluster of quality-conscious, which makes up 28.1 % of the participants, can therefore be seen as the core target group. The results are congruent with the present market share of 20 % of pasture-raised Danish milk (Heerwagen et al. 2013) and the calculated WTP: While the first and fourth clusters have similar attitudes towards the housing systems, the WTP of the quality-conscious cluster at € 1.13 is 12 cents higher than the WTP of the pasture-supporters. The fourth cluster of pasture-supporters (28.3 %)

can be seen as an extended target group given that they also prefer pasturing, but are not willing to pay such a high price for pasture-raised milk as the quality-conscious cluster. The differences between cluster 1 and cluster 4 are a strong indication of a possible consumer-citizen-gap. Both clusters show similar attitudes concerning the factor pro pasturing and pro fully housed system. But when comparing the WTP for pasture-raised milk between the clusters, it can be seen that the first cluster has a significantly higher WTP (€ 1.13) than the fourth cluster (€ 1.01). Thus, it can be assumed that for the fourth cluster pasturing is not an important buying motive and so does not influence the purchase decision what is also supported by their lower agreement to quality attributes.

The third cluster, the generalists (25.7 %), may also be an extended target group for pasture-raised products. Statements about pasture-access are important for them, but they do not disapprove of indoor-housing as much as the other groups. In this respect they agree particularly with the statements in favour of the indoor-housing system that refer to advantages for animals (e.g., "In indoor systems, animal illness will be noticed faster."). In addition, they tend to look for animal-friendly produced products ($\mu = 0.47$). If they are informed about the gains of outdoor systems it might influence their purchasing decision. The positive attitude towards both housing systems ($\mu = 1.18$; $\mu = 1.04$) confirms that indoor and outdoor systems are separately perceived. Consumers in the third cluster see positive aspects for indoor and outdoor systems. They seem to be open to arguments for both housing systems.

A clear market potential for pasture-raised milk is thus shown. Moreover, all groups would pay a surcharge for pasture-raised milk, which is consistent with results from previous surveys (Pirog 2004; Ellis et al. 2009, Hellberg-Bahr et al. 2012). The results mean that a financial incentive for producing pasture-raised milk and dairy products would be reasonable for producers, processors and marketers, as long as this aspect is highlighted and promoted on the product. Offering an incentive is important in developing a solid market. However, the calculated WTP has to be carefully considered due to the theory of the consumer-citizen-gap. A known gap exists between the attitudes of citizens and their actual behaviour as customers during their purchasing situations (especially with respect to animal welfare aspects in food) (Coff et al. 2008; Harvey and Hubbard 2013). Animal welfare aspects as well as environmental and quality aspects can be overlooked during the decision-making process in the supermarket as while completing the survey customers are answering as citizens who are presenting their general opinion. The two most promising target groups differ in their attitudes towards quality orientation ($\mu = 0.97$ for the first cluster and $\mu = -0.15$ for the fourth cluster) and their WTP (€ 1.13 and € 1.01), which might confirm that for some customers there is a gap in their behaviour as citizen and consumer. While the quality-conscious will also pay a premium, pasturing-supporters decide according to the price they see on the product shelf in the supermarket. This is confirmed by the significantly higher WTP of the first cluster.

Conclusions

As the results show, housed systems evoke negative connotations. In the semantic differential and the cluster analysis more than 50 % of respondents consider fully housed systems problematic. Obviously, many consumers have clear preferences for pasturing. This attitude has already created a severe image problem for those keeping laying hens in cages. In Germany,

today, legal guidelines forbid this type of livestock farming. In order to prevent a similar crisis, the dairy sector has to face up to this consumer perception.

At first thought it could be seen as a paradox to compensate by a higher price and used as a marketing tool the fact that dairy cattle have access to pasture, given that this was a norm only a few decades ago. The changes of structure in dairy farming (less use of grassland in dairy farming; see above) have caused the dairy sector to face up to these new issues. The conducted consumer survey shows that pasturing is an important issue for customers and can be used as a sales argument for a relatively large group of customers.

Today, only a few countries, such as the Netherlands, have consistent standards for dairy products labelled as pasture-raised. But it is only fixed standards for the term pasture-raised milk that can guarantee consumers will not feel deluded. Honest and transparent standards and an appropriate labelling system for pasture-raised milk must therefore be built up in the near future to target cluster one: a consumer group of 28.1 % of the German population which is characterized by a significantly higher WTP for pasture-raised milk. Otherwise, farmers may tend to give up on pasture-grazing for their dairy cattle due to higher economies of scale of indoor housing systems. Additionally, a study by Kehlbacher et al. (2012) examined the fact that information about certification has a positive influence on WTP. It is therefore important to live up to the demands of consumers and also to the practicalities of farmers. Taking all market participants into account, a solid system can be generated that retains and builds upon the grazing system. Given these conditions, the market potential demonstrated encourages farmers and the dairy-products sector to highlight and promote the positive aspects of pasture-raised milk.

Limitations

Due to the discrepancy between consumer and citizen, future WTP research has to be verified by demonstrated preferences, e.g., in a supermarket test. Furthermore, the results are only valid for the German population and no comparable research yet exists for housing systems. Further research in Germany and in additional countries therefore needs to be carried out to discover consistent or contrary results. The survey also provides hints on the importance of food source for dairy cows in terms of grass and the fatty acid composition of milk in terms of omega-3 fatty acids. More detailed research is necessary to evaluate their importance on a purchasing decision. For example, in Austria instead of pasture-raised milk, a prominent marketing trend in the milk sector is hay milk (“Heumilch”), a label that guarantees the abandonment of silage fodder.

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Appendix

Table 5. Results of the cluster analysis

	Cluster 1 Quality-Conscious	**Cluster 2 Undecided**	**Cluster 3 Generalists**	**Cluster 4 Pasture-Supporters**	**Sample** [6]
Cluster size absolute and in %	281 (28.1 %)	179 (17.9 %)	257 (25.7 %)	283 (28.3 %)	
	Mean value (SD) [factor value]	Mean value (SD) [factor value]	Mean value (SD) [factor value]	Mean value (SD) [factor value]	Mean value (SD)
Factor 1: Pro Pasturing[1]	**1.57 (0.561) [0.36]**	**0.2 (0.855) [-1.54]**	**1.18 (0.711) [0.05]**	**1.55 (0.563) [0.57]**	
For me, pasturing is the most natural form of dairy farming.[4]	1.54[ad] (0.708)	0.28 (0.895)	1.16 (0.784)	1.56[ad] (0.633)	1.22 (0.880)
I cannot imagine an agricultural landscape without grazing cows.[4]	1.4[ad] (0.765)	0.02 (0.840)	0.92 (0.879)	1.36[ad] (0.766)	1.02 (0.955)
Fresh grass as feed makes animals healthier.[4]	1.51[ad] (0.683)	0.15 (0.771)	1.2 (0.693)	1.42[ad] (0.663)	1.16 (0.851)
Dairy cows need outdoor exercise in the fresh air.[4]	1.66[ad] (0.632)	0.26 (0.833)	1.18 (0.690)	1.6[ad] (0.582)	1.27 (0.844)
Outdoor exercise in the fresh air is important to make the animals feel comfortable.[4]	1.7[ad] (0.506)	0.36 (0.796)	1.34 (0.614)	1.72[ad] (0.489)	1.37 (0.771)
Pasture grass is important for the proper nutrition of animals.[4]	1.69[ad] (0.494)	0.28 (0.762)	1.28 (0.677)	1.63[ad] (0.539)	1.32 (0.794)
Dairy cows at pasture are important in our agricultural landscape.[4]	1.5[ad] (0.628)	0.07 (0.768)	1.15 (0.760)	1.51[ad] (0.662)	1.16 (0.877)
Pasture is important for our natural environment.[4]	1.59[ad] (0.633)	0.2 (0.794)	1.22 (0.744)	1.59[ad] (0.618)	1.25 (0.859)
Factor 2: Pro Fully Housed Systems[2]	**-0.58 (0.706) [-0.62]**	**-0.06 (0.692) [-0.24[bd]]**	**1.04 (0.506) [1.27]**	**-0.31 (0.718) [-0.36[bd]]**	
Milk can be produced more cost-effectively in indoor systems.[4]	-0.36 (1.247)	0.22[bd] (1.083)	1.25 (0.979)	0.17[bd] (1.289)	0.30 (1.314)
I can understand that farmers these days do not want to push dairy cows onto pasturage every day.[4]	-0.27[ab; ad] (1.050)	-0.08[ab; bc] (0.878)	0.51[bc] (0.977)	-0.27[ad] (1.059)	-0.04 (1.053)
Dairy cows in indoor systems produce more milk and are therefore more climate-friendly.[5]	-1.03[ad] (0.862)	-0.24 (0.852)	0.45 (1.204)	-0.96[ad] (0.751)	-0.50 (1.115)
Dairy cows in indoor systems are better looked after.[5]	-0.71 (0.889)	-0.03 (0.885)	1.33 (0.966)	-0.36 (1.071)	0.02 (1.243)
Dairy cows in indoor systems can be fed according to requirements.[5]	-0.86[ad] (0.891)	-0.22 (0.872)	0.91 (1.128)	-0.72[ad] (0.951)	-0.26 (1.200)
Dairy cows in indoor systems are better protected against heat and cold.[5]	-0.51 (1.014)	-0.12[bd] (0.890)	1.33 (0.951)	-0.02[bd] (1.159)	0.16 (1.239)
Animal illness will be noticed faster in indoor systems.[5]	-0.35 (1.118)	0.04[bd] (0.982)	1.46 (0.877)	-0.02[bd] (1.251)	0.27 (1.291)

Table 5. *Continued*

Factor 3: Quality Orientation[3]	**0.97 (0.621) [0.93]**	**-0.09 (0.808) [-0.1^{bc}]**	**0.27 (0.834) [0.06^{bc}]**	**-0.15 (0.675) [-0.88]**	
I prefer buying milk from my region.[4]	0.78 (1.030)	-0.1^{bd} (1.083)	0.34 (1.139)	-0.29^{bd} (1.133)	0.20 (1.178)
For known brands, I would definitely pay a surcharge.[4]	0.39 (1.182)	-0.52 (1.088)	-0.23 (1.180)	-0.84 (1.015)	-0.28 (1.219)
I mostly buy organic milk.[4]	-0.1 (1.252)	-0.74^{bc} (1.098)	-0.94^{bc} (1.079)	-1.49 (0.698)	-0.84 (1.165)
Healthy nutrition is important to me.[4]	1.6 (0.533)	0.31 (0.749)	0.96 (0.706)	0.73 (0.836)	0.95 (0.844)
I like to try new things.[4]	1.39 (0.700)	0.24 (0.785)	0.84 (0.827)	0.56 (0.836)	0.81 (0.889)
While shopping I try to look out for products that were produced in an environmentally-friendly way.[4]	1.34 (0.700)	0.12^{bd} (0.769)	0.45 (0.849)	0.06^{bd} (0.823)	0.53 (0.947)
While shopping I try to look out for products that were produced in an animal-friendly way.[4]	1.38 (0.668)	0.08^{bd} (0.788)	0.47 (0.821)	0.21^{bd} (0.894)	0.58 (0.950)

All results are significant at the 0.1 % level; n = 1,000; SD = standard deviation
[1] Min. = -5.32; Max. = 2.07
[2] Min. = -2.76; Max. = 2.35
[3] Min. = -3.95; Max. = 3.13
[4] Scale from +2 = "I totally agree" to -2 = "I totally disagree"
[5] Scale from +2 = "I find it very convincing" to -2 = "I do not find it convincing at all"
[6] n = 1,000-1,009
a, b, c, d: If the values in one row are marked with the same letters, the difference between the clusters is not significant (Tamhane's/Scheffé's post hoc test)

