Consumers' attitudes towards different dairy housing systems and implications for pasture-raised milk marketing

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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

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Problem Statement

There is currently much debate surrounding the housing systems for dairy cattle. At one end of the spectrum there are purely indoor housing systems that aim to maximize the milk production per cow (high-output), at the other, cost-minimizing systems focused on pasture-grazing (low-input) (Steinwidder and Starz 2006, Baur et al. 2010). Both systems have their advantages and can be cost efficient. This depends on several conditions, such as consolidated pasture or legal requirements. Thus, globally there is a wide variation in systems. Housing systems with pasture access predominate in some countries like New Zealand or Australia. Here, the landscape is dominated by immense grasslands that can be used for farm animals. Indoor housing systems with brought-in forage are preferred in other countries (e. g. parts of the USA, China, the Netherlands, Germany or Denmark; IFCN 2007, Isermeyer et al. 2003, The Cattle Site 2010) and are often more profitable if no higher price for pasture-raised milk is paid to the farmers (Schleyer et al. 2013). These countries are characterized by regions with limited grazing areas. This fact is accompanied with limitations for the increase of farms with access to pasture. Often it is not possible to obtain more pasture around the farms. Thus, pasture management is not a viable option for every dairy farmer (Ostermann-Palz and Stöcker 2013). Most farmers in Northwest Europe opt for the more efficient high-input alternative. Ireland and Sweden are two exceptions in Europe: Ireland has a lot of grassland available, so that pasture management seems to be the most obvious option for dairy farms. Forecasts for Ireland predict that in the year 2025, 100 % of the dairy farms will still have pasture access for minimum 12 hours per day in summertime (Reijs et al. 2013). In contrast, Sweden has regulations for dairy farms so that the cows must have access to pasture for at least six hours per day in summer (Spörndly 2012). For the rest of Northwest Europe, however, a decline in dairy farms with pasture management is predicted from almost 50 % in 2012 to 5 % in 2025 (Reijs et al. 2013).

Additionally, at this time in all countries there is an apparent trend to move away from small farms towards larger farms. For example, there are now dairy herds with more than 2,000 cows in farms in the USA (USDA 2010). Despite the steadily growing volume of milk produced, the total number of dairy farms in the USA is declining: while there were 97,460 farms in 2001, by 2009 this number had dropped to 65,000 (a reduction of 33 %). However, the number of farms with more than 500 cows has increased (ibid.). Similar effects have been observed in Germany (Isermeyer 2009), the Netherlands (Ham et al. 2010), Canada (van Doormaal 2008), China (Ma et al. 2011) and also in New Zealand (DairyNZ 2012), Australia and South Africa (FAO n. d.). This trend, together with the comparatively small area of pasture in Denmark, the Netherlands and Germany, reinforces the decline of outdoor systems in high input regions in Northwest Europe. Added to the fact that there is a lack of pasture in most regions of Northwest Europe, it is getting harder to manage a stock of dairy cows in an outdoor housing system with an increase in the herd size (Spiekers 2010). Due to practical experiences, an outdoor system with more than 100 cows is hardly manageable (Schleyer et al. 2013). This is supported by the results of the data collection in Germany about the share of pasture in relation to the herd size: here the share of farms with access to pasture decrease by a herd size of more than 100 cows (Deutscher Bundestag 2011). The present paper focuses the development on high input systems, especially in Denmark, the Netherlands and Germany.

Particularly in these countries the downward movement of grazing is controversial respective to environmental and animal welfare aspects. The decline of pasture is criticised for several reasons. Pasture represents the natural environment for dairy cattle (Schrader and Mayer 2004), so this system increases the well-being of the animals (EFSA 2009, Rushen 2012). In addition, low intensity grazing and hay-making positively affects the environment and biodiversity (Rook and Tallowin 2003, Verband der Landwirtschaftskammern 2010). For the general public, the fact that the dairy cattle are visible is also important for the collective understanding of dairy farming and seems to have a positive influence on its image. At least, the image of the dairy industry is not as negative as the one for the meat industry (Schleyer et al. 2013). In general, several studies show that consumers prefer outdoor housing systems or at least an access to pasture for the animals. Access to the open-air is very important in the view of most consumers (Fearne and Lavelle 1996, Deimel et al. 2012). This factor could have an important influence on the image of an industrial sector as well as on the food processing sector. How eminent the perception of an industrial sector is can be seen on the case of the battery cages for laying hens. The area of tension interplay regarding the keeping of laying hens in cages supports the consumers' attitude towards free range. The pressure from the consumers was the reason why eggs from hens in batteries are forbidden in Germany today (Oppermann et al. 2009). But there is no specific research for the reasons for the approval of free range systems – particularly not for the dairy sector. For this reason it seems to be very important to know about the consumers' attitudes towards the different housing systems.

Initial indications that consumers prefer pasture based systems for dairy cattle can be seen by the fact that pasture-raised milk has already a market share of 20 % in Denmark (Heerwagen et al. 2013). In Germany, there are first efforts to launch pasture-raised milk. Also in other countries like the Netherlands (FrieslandCampina), Switzerland (Mirgros), the USA (Sweet Meadows Farms) and as mentioned Denmark (Arla Foods), premium products with the term "pasture" or "meadow" have been established so that a higher price for pasture-raised milk can constitute an incentive for farmers to still use pasture-based systems. Furthermore, some studies showed that a segment of the consumers 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]). Animal welfare (Ellis et al. 2009) and environmental aspects were identified as major reasons for this, as well as the expectation of a healthier product (Hellberg-Bahr et al. 2012). For some consumers, 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. It describes the gap between the attitudes of citizens and their actual behaviour as customers during their shopping situations – especially respective to animal welfare aspects in food (Coff et al. 2008, Harvey and Hubbard 2013). Although citizens state that they support pasturing, they do not need to buy it as consumers. This leads to the conclusion that in the survey presented in this paper, besides analysing the attitudes toward indoor and outdoor housing systems, should also integrate the quality orientation of the consumers. This evidence permits further information to separate consumers regarding their buying behaviour for foods, especially milk. This is particular interesting for the German market because the market share of pasture-raised products is little until now.

Objectives

All presented studies in the last section focus on if consumers would buy pasture-raised milk, on WTP analyses and consumers' general preferences for free range in livestock farming. The difference in the housing systems is not the focal point in that research or not included at all.

For strategic decisions for the involved industry it is also important to learn more about the attitudes towards housing systems and food quality.

This paper contributes important background information regarding the perception of housing systems. How important is pasturing for consumers? How is the image of indoor systems? This is good to know for farmers, agricultural technology and constructors for animal sheds, so that they are prepared for a possible development regarding to the expectations of the consumers. The following factor and cluster analyses have the advantage of combining the consumers' attitudes towards indoor and outdoor systems and, at the same time, separate the consumers in regards to their quality orientation. Thus, the market potential for pasture-raised milk and further manufactured products can be established. The results also give recommendations for strategic decisions in the long run. The generated knowledge is, therefore, also especially important to dairies and processing dairy industry for their long-term strategic decisions.

Methodology

The data collection took place in July 2013 through an online access panel. The sample size is 1,009. To get representative results for the German population, quotas were set for age, gender, education and regional distribution. The survey consisted of questions on milk purchase frequency as well as the relevance of the production of milk 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 show the first impression of consumers due to pictures of indoor and outdoor systems. The association was asked by a semantic differential. One set of questions showed three pictures of modern indoor house systems and the other set displayed cows on pasture. Both sets were presented randomly in order to prevent sequence effects. Afterwards, an explorative factor analysis was used to reduce the complexity. Subsequently, a cluster analysis was conducted to identify different consumer clusters. The cluster analysis was performed in several steps in order to optimize the result. Ward's method was used as a cluster method, and the squared Euclidean distance was used 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. 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 socio-demographical differences between the resulting clusters.

Results

Due to the set quotas, the survey represents the German population. The average age is 41 years, 49.4 % are male and 50.6 % are female. Also the regional distribution and the education levels correspond with the German population. 29.9 % of the respondents have a net household income of less than 1,500 € monthly, 28.4 % have between 1,500 € and 2,500 € and 24 % have 2,500 € or more. 17.9 % is not specified.

In a first step, the respondents were asked to give their semantic association to pictures of cows by means of a semantic differential (figure 1 and figure 2). The following tables 1 and 2 show higher mean values for the positively connoted words for the picture of the outdoor systems.

Figure 1. Presented pictures of indoor systems

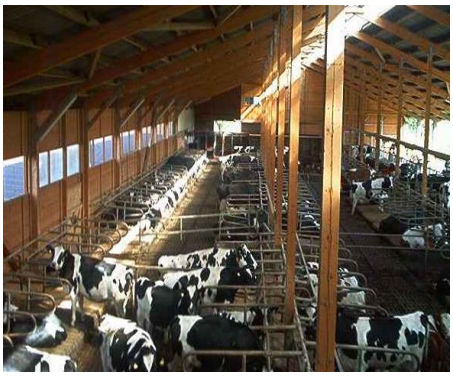
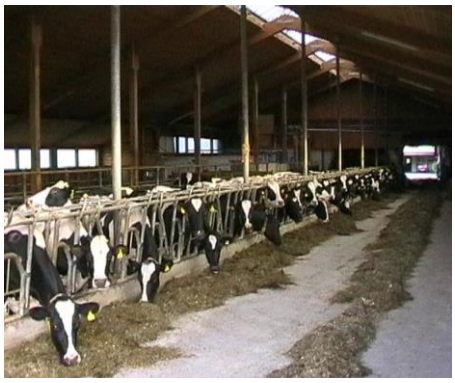


Table 1. Semantic differential for indoor housing systems (answers in %)

	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	unnaturally	-0.84
n = 995-1,003							

Figure 2. Presented pictures of outdoor systems



Table 2. Semantic differential for outdoor housing systems

	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	unnaturally	1.61
n = 999-1,004							

The next step is the factor analysis. According to the Kaiser-Meyer-Olkin criterion, the result of the factor analysis is excellent (KMO = 0.929; Kaiser 1974). The Bartlett's test of sphericity is highly significant, which demonstrates that the variables are highly correlated (Backhaus et al. 2006). Three of the resulting six factors entered the cluster analysis. Therefore, only those three factors are presented here. The first factor includes eight items regarding pasture-raised milk. Accordingly, it is named pro pasturing. The second factor combines seven items that are pro indoor systems and is, therefore, characterised as pro indoor systems. The third factor includes seven items regarding attitudes towards quality. Items loading on this factor are referring to regional milk purchase, WTP for known brands, purchase of organic milk as well as environment-friendly and animal-friendly production standards and the items "A healthy nutrition is important to me" and "I like to try new things". All items and factor loadings are outlined in detail in table 3.

Table 3. 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 a good nutrition of the animals.	0.847
Outdoors exercise in the fresh air is important to make the animals feel comfortable.	0.826
Pasture is important for our nature.	0.802
Dairy cows at pasture are important in our agricultural landscape.	0.799
Dairy cows need exercise outdoors in the fresh air.	0.745
Fresh grass as feed makes the animal 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 indoor systems (Cronbach's Alpha = 0.833; % of variance = 11.994)	
In indoor systems, dairy cows are looked after better.	0.799
In indoor systems, animal illness will be noticed faster.	0.746
In indoor systems, milk cows can be fed according to requirements.	0.741
In indoor systems, dairy cows 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
With indoor systems milk can be produced more cost-effectively.	0.631
I can understand that nowadays farmers do not want to push the dairy cows on pasturage every day.	0.445
Quality orientation (Cronbach's Alpha = 0.809; % of variance = 9.959)	
Doing the shopping I try to keep aware that products were produced in an environmentally friendly manner.	0.703
Doing the shopping I try to keep aware that products were produced in an animal friendly manner.	0.689
I mostly buy organic milk.	0.680
For known brands, I would definitely pay a surcharge.	0.609
I prefer buying milk in my region.	0.565
A healthy nutrition is important to me.	0.556
I like to try new things.	0.519
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 solution of four clusters was decided upon. K-means gave F values for all cluster-forming variables that were significant at the 1 % level, suggesting that the clusters were homogeneous. The average value for Eta was 0.726, showing that there are significant differences between the cluster-forming factors and that the variance within the clusters is negligible. Eta-squared was 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 4 contains the detailed results of the cluster analysis.

Table 4. Results of the cluster analysis

	Cluster 1 Quality-conscious	**Cluster 2 Undecided**	**Cluster 3 Generalists**	**Cluster 4 Pasturing 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 the animal 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 exercise outdoors 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)
Outdoors 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 a good nutrition of the 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 nature.[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 indoor 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]]**	

With indoor systems milk can be produced more cost-effectively.[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 nowadays farmers do not want to push the dairy cows on 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)
In indoor systems, dairy cows are looked after better.[5]	-0.71 (0.889)	-0.03 (0.885)	1.33 (0.966)	-0.36 (1.071)	0.02 (1.243)
In indoor systems, milk cows 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)
In indoor systems, dairy cows 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)
In indoor systems, animal illness will be noticed faster.[5]	-0.35 (1.118)	0.04[bd] (0.982)	1.46 (0.877)	-0.02[bd] (1.251)	0.27 (1.291)
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 in 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)
A 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)
Doing the shopping I try to keep aware that products were produced in an environmentally friendly manner.[4]	1.34 (0.700)	0.12[bd] (0.769)	0.45 (0.849)	0.06[bd] (0.823)	0.53 (0.947)

Doing the shopping I try to keep aware that products were produced in an animal friendly manner.[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 find it not 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)

The four clusters can be characterized as follows: The first cluster is the second largest, with a size of 281 consumers. It has high mean values for the factors pro pasturing and quality orientation, whereas the factor pro indoor systems has a negative mean value. Therefore, it can be named the "quality-conscious" cluster. The second cluster is the smallest one. It has no high values for any mean value. Hence, it is characterised 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 factors pro pasturing and pro indoor systems. This cluster is named the "generalists". The fourth cluster is the largest one. It has a high value for the factor pro pasturing, but less high values for the factors pro indoor systems and quality orientation. Thus, it can be characterised as the "pasturing supporters" cluster.

The results illustrate that clusters 1, 3 and 4 have the highest mean values for the factor pro pasturing. Because the third cluster also has a high score for the factor pro indoor systems, this cluster is less recommended as target group for pasture-raised milk. Regarding the factor quality orientation, importance can be seen for the consumers in the first cluster, whereas the 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 in the first cluster there are significantly more women and more consumers with a higher education level, in cluster number four, consumers of the lower income classes are overrepresented. Furthermore, in this group there are significantly more consumers with only a secondary school education and significantly fewer with a university degree.

Moreover, the WTP for 1 litre of pasture-raised milk was calculated within the different clusters compared to reference prices that were given to the respondents (trade mark [0.65 €], milk brand one [0.95 €], organic milk [1.05 €], milk brand two [1.25 €]). For the first cluster there is a result of 1.13 €, for the second there is a WTP of 0.98 € and the respondents of the third and fourth cluster each stated a WTP of 1.01 € for 1 litre pasture-raised milk. The WTP of the first cluster is significantly higher than the WTP of the other clusters.

Discussion

The literature shows that there is a gap between the concentration on large farm sizes that prefer indoor housing systems for dairy cattle (Schleyer et al. 2013) on the one hand and customers demanding milk from cows with an access to pasture (Ellis et al. 2009, WSPA 2010) on the other hand. The presented survey reveals that the consumers differ in their attitudes towards the different housing systems and their quality orientation. As the sample was representative, the results can be transferred to the German population. A clear market potential for pasture-raised milk is shown. Already, the semantic differential indicates clearly that the outdoor housing systems have positive connotations whereas the pictures of the indoor systems evoke more negative emotions. The factor analysis confirms this separated perception of indoor and outdoor systems as the items load on two different factors. Thus, a positive image of pasture does not accompany negative associations of an indoor system. Especially, the first cluster of the quality-conscious with a high education level is a suitable target group, but also the fourth cluster may be appropriate as they attach value to pasturing. Both clusters show a high agreement to statements with respect to cows having an access to pasture and fresh air. They also agree that they want to retain dairy cattle in the landscape.

Furthermore, there are clear differences between the clusters regarding quality aspects. For the respondents in the first cluster it is important to know the origin of the milk they buy. They have the highest agreement to the statements "Doing the shopping I try to keep aware that products were produced in an environmentally friendly manner." ($\mu = 1.34$) and "Doing the shopping I try to keep aware that products were produced in an animal friendly manner." ($\mu = 1.38$). These two statements are less distinctive for the fourth cluster ($\mu = 0.06$ and

$\mu = 0.21$). Generally, the quality orientation is not an important aspect for the pasturing supporters ($\mu = -0.15$). This might be due to the fact that in the fourth cluster there are significantly more respondents with a lower education level and also significantly more respondents distributed within the two lowest income classes. To these consumers pasturing might be a very important aspect, but while shopping they pay less attention to food quality aspects. The price might be more important. Thus, the first cluster of the quality-conscious of 28.1 % can be considered as the core target group. The results are congruent with the present market share of 20 % of pasture-raised milk in Denmark (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-orientated is with 1.13 € 12 Cent higher than the WTP of the pasture-supporters. The fourth cluster of the pasture-supporters (28.3 %) can be deliberated as an extended target group.

Also, the third cluster of the generalists (25.7 %) may be an extended target group for pasture-raised products. For them, the statements for pasture-access are also important. Furthermore, they do not disapprove indoor-housing as much as the other groups. Here they agree especially to the statements for the indoor-housing system that refer to the advantages to the animals (e.g., "In indoor systems, animal illness will be noticed faster."). Additionally, they tend to look for animal-friendly production if they have to choose a product ($\mu = 0.47$). If they are informed about the gains of outdoor-housing systems it might be influencing the purchasing decision. The positive attitude towards both housing systems ($\mu = 1.18$; $\mu = 1.04$) confirms that indoor and outdoor systems are perceived separately. Consumers in the third cluster see positive aspects for indoor and outdoor systems. They seem to be open for arguments of both housing systems.

Furthermore, all groups would pay a surcharge for pasture-raised milk, which is consistent with the results by known surveys (Pirog 2004, Ellis et al. 2009, Hellberg-Bahr et al. 2012). This means for producers, processors and marketers that a financial incentive to produce pasture-raised milk and dairy products should be reasonable if this aspect is highlighted and promoted for the product. Offering an incentive is important to develop a solid market. However, the calculated WTP has to be considered carefully due to the theory of the "customer-citizen-gap". It is known that there is a gap between the attitudes as citizens and their actual behaviour as customers during their buying situations – especially with respect to animal welfare aspects in food (Coff et al. 2008, Harvey and Hubbard 2013). The animal welfare aspects can be blinded out during the decision making in the supermarket because they answer in the survey as a citizen who is presenting his opinion in general. 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) what might confirm this gap. While the quality-conscious will also pay a premium, the pasturing-supporters decide upon the price facing the product rule in the supermarket. This is confirmed by the significantly higher WTP of the first cluster.

Conclusions

As the results show, indoor systems have negative connotations. In the semantic differential and the cluster analysis more than 50 % of the respondents consider pure indoor systems problematically. The target group (cluster 1) still consists of 28.1 % of the consumers which is supported by the significantly higher WTP for pasture-raised milk. Obviously, many consumers have clear preferences for pasturing. This attitude already has become a severe image problem regarding the keeping of laying hens in cages. Today, in Germany, the legal guidelines forbid this type of livestock farming. The dairy sector has to face this consumers' perception in order to prevent a similar crisis.

At the first moment it could be seen as contrary that the fact that dairy cattle have access to pasture is compensated with a higher price, as it was a normal fact only a few decades ago. The change of structure in dairy farming (less use of grassland in dairy farming; see above) caused the dairy sector to deal with these new themes. Until now, there are only a few countries like the Netherlands where consistent standards exist. But only fixed standards can guarantee that the consumers will not feel deluded. Therefore, honest and transparent standards and an appropriate labelling system for pasture-raised milk have to be built up in the near future. Otherwise, the farmers could tend to give up the pasture grazing for their dairy cattle due to the missing price incentive, which is no longer guaranteed. Additionally, a study by Kehlbacher et al. (2012) examined that the value of information about the certification has a positive influence on the WTP. However, it is important to live up to the demands of the customers and also the practicality of the farmers. Considering all market participants, a solid system can be generated to retain and build upon grazing systems. Given these conditions, the shown market potential encourages farmers and dairy-products sector to highlight and promote the positive aspects of pasture-raised milk. If this trend to pasture-raised milk is accepted in the long run it will also have an impact on the constructors of animal sheds and agricultural technology. Besides indoor systems, constructors should also have a product range for outdoor systems, e. g., shelters against cold and heat or mobile milking robots. Given improved technological possibilities, pasturing can become manageable also for larger herd sizes. Furthermore, an enhancement in mobile milking at pasture can support the farmers' acceptance of low cost strategy.

Limitations

Due to the discrepancy between the consumer and the citizen, in future research the WTP has to be checked by revealed preferences, e. g., in a test supermarket. Furthermore, the results are only valid for the German population and there is no comparable research for housing systems yet. Therefore, further research in Germany and in additional countries should be carried out in order to find consistent or contrary results. The survey also gives hints to the importance of the food source of dairy cows regarding grass and also the fatty acid composition of the milk regarding omega-3 fatty acids. More detailed research is necessary to work the importance for a buying decision out.

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