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Diversifying meat consumption patterns: Consumers' self-reported past behaviour and intentions for change

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ABSTRACT

This study analysed meat consumption patterns among Finnish consumers, considering both stated past changes and intended future changes. Consumer segments with different patterns of and reasons for change were identified. Latent class analysis revealed six consumer clusters that formed three major cluster blocks. The first block, comprising 48% of the consumers, had established consumption patterns and no intentions to change them. In the second block, with 13% of the consumers, consumption patterns had already shifted towards more vegetables and less meat. The third block, with 39% of the consumers, was identified to be in the middle of a change with a general tendency to reduce the use of meat and increase the use of vegetables. Although the environmental effects of meat and animal welfare issues were important reasons for change in some clusters, healthiness was the most salient stated reason for changing consumption habits.

Keywords: Meat consumption; Healthiness; Animal welfare; Environmental effects; Latent class analysis; Segmentation

1. Introduction

Meat is a contested area of food production and consumption. Historically, meat has been a scarce and highly appreciated foodstuff, a source of energy and protein, and a palatable food carrying the images of strength, power and masculinity (Twigg 1983, Fiddes 1991). Even today, meat is an important part of Western food cultures, and is increasing in importance in other parts of the world. For many people, a meal without meat is a rare exception. However, during the past few decades, meat has increasingly become a subject of controversies relating to health and safety, the environment and animal welfare (Vinnari & Tapio 2009).

Even though some studies have already reported signs of people in industrialized countries eating less meat than before (Fresco 2009), globally the trend is the opposite. For instance, Fiala (2008) forecasted the consumption of meat worldwide to rise by 72% between 2000 and 2030, and Steinfeld et al. (2006) projected the global production of meat to more than double between 2000 and 2050 due to the increasing world population, rising incomes and urbanization. In 2007, an average European Union citizen ate 91 kg of meat per year (Saarnivaara et al. 2009). The consumption of meat has also increased for several decades in Finland. Between 1970 and 2009, the yearly per capita consumption of meat increased from around 50 kg to 74 kg (Tike 2010).

In much of the previous research on consumer perspectives on meat, the focus has been on quality attributes and perceived quality (see, e.g., Verbeke & Viaene 1999, Glitsch 2000, McIlveen & Buchanan 2001, Grunert et al. 2004, Grunert 2006, Krystallis et al. 2007), as well as on perceptions of the risks and safety of meat (e.g., Yeung & Morris 2001, Yeung & Yee 2002, Mahon & Cowan 2004, Verbeke & Vackier 2004, Korzen et al. 2011). Compared to the expansive research in the past on consumer perceptions of the quality and quality attributes of meat, there has been relatively little research on factors that affect the consumption and changes in consumption of meat in general.

However, the recent debate on the ethical and environmental aspects of meat production and consumption can be seen in new research questions arising in studies on consumer perspectives on meat. During the 2000s, consumer studies have increasingly focused on attitudes towards and the importance of animal welfare issues (McEachern et al. 2002, European Commission 2005, Mayfield et al. 2007). Despite this, so far few studies have explored how and to what extent people's expectations of meat and meat production materialize as changes in consumption (see, however, Verbeke & Viaene (1999) and Verbeke & Vackier (2004)). Therefore, in this article we examine changes in meat consumption among Finnish consumers, taking into account both stated past changes and intended future changes. Based on these changes, we identify consumer segments and investigate the ways in which these segments differ from each other socio-demographically and with respect to both current meat consumption and the stated reasons for change.

2. Factors affecting meat consumption and its changes

In the following, we review the existing literature on sociodemographic and attitude-related factors that influence meat consumption.

2.1. Sociodemographic differences in meat consumption

Previous research indicates that there is sociodemographic variation in the consumption of meat. In 2009, a survey on the health and dietary habits of 15- to 64-year-old Finns (Helakorpi et al. 2010) revealed that in total 44% (51% of men and 38% of women) of the population had eaten meat on three or more days in the week preceding the survey. Only nine per cent of the respondents had not eaten meat at all. The frequency of meat consumption decreased with age: while 69% of 15- to 24-year-old men ate meat on at least three days a week, the respective figure among 55- to 64-year-old men was only 41%. For women, the pattern was similar but less obvious. The consumption frequencies indicated that men with a higher educational level ate meat more often than less educated men, whereas for women the opposite association with education was recorded: more educated women ate meat less often than less educated women.

These results are largely in line with studies in other countries. For instance, based on national survey data from the mid-1990s, Yen et al. (2008) found that men in the US ate more meat than women, the consumption of meat declined with age, and those with a high income ate more meat than those with low income (see also Guenther et al. 2005). Similarly, a European study analysing pork use in Belgium, Denmark, Germany and Poland suggested that consumer segments differing in the frequency and variety of pork consumption differed from each other socio-economically (Verbeke et al. 2011). In the 'high variety, high frequency' group the consumers were typically men and with a relatively low level of education, whereas 'non-pork eaters' were typically women and young, and consumers in the 'low variety, low frequency' group were typically women. The 'high variety, medium frequency' group was financially well-off.

2.2. Attitudes related to meat attributes and meat consumption

Several studies have suggested that taste, safety, healthiness, price and animal welfare play a role in consumers' decisions to buy meat. For instance, according to McCarthy et al. (2004), price, taste, safety, health and environmental factors are all significant in consumption behaviour towards meat. Frewer et al. (2005) identified food safety, freshness, taste, healthiness, the absence of medicine residues and animal welfare, in that order, as the most important perceived factors for consumers purchasing pork. A recent study by Verbeke et al. (2010) investigated pork-related consumption patterns and attitudes in five countries (Belgium, Denmark, Germany, Greece and Poland). They identified four segments named as 'environmentally conscious citizens' (15%), 'weak attitude citizens' (54%), 'animal welfare conscious citizens' (11%) and 'small farm supporting citizens' (11%), and found that the association between attitudes and consumption behaviours was not very strong. However, the study demonstrated that both environmental and animal welfare issues were gaining increasing importance among European consumers, at least on an attitudinal level.

Indeed, several studies have pointed out that many people are concerned about animal welfare (e.g. Harper & Makatouni 2002, McEachern & Schröder 2002, Vanhonacker et al. 2007), but national differences in attitudes and worries are evident (European Commission 2005, Mayfield et al. 2007). In contrast to the growing interest in animal welfare issues, research on consumer perspectives on the environmental effects of meat production and consumption was for long relatively scarce. Recently studies on meat attitudes have also started to take environmental issues directly into account in the research questions and questionnaire design (e.g. Verbeke et al. 2010).

2.3. Changing meat-eating patterns

To date there has been less research on changes in meat consumption than on general attitudes towards meat and factors affecting consumption. However, some studies during the past decade have revealed that attitudes are related not only to current consumption but also to consumption intentions. For instance, Verbeke and Viaene (1999) concluded that in Belgium, particularly people whose top five important meat attributes included leanness said that they had reduced their meat consumption during the previous year, and people who valued meat being free of hormones were most eager to reduce their consumption in the future. Furthermore, the past changes and future intentions were related to perceptions associated with different meat types. For instance, the less people believed that beef has a good taste and is safe, healthy, trustworthy, of good quality, produced in an animal friendly way and without hormones and other harmful substances, the more they intended to reduce their meat consumption in the future.

In a segmentation study of Belgian meat eaters, Verbeke and Vackier (2004) identified four consumer segments, 'straightforward meat lovers', 'cautious meat lovers', 'indifferent meat consumers' and 'concerned meat consumers', differing in their involvement in meat but also in their safety and healthiness concerns, as well as in their past and intended changes in meat consumption. The 'concerned meat consumers' were most concerned with the safety and healthiness of meat, they had reduced eating meat most often, mostly due to BSE and the dioxin crisis in Belgium, and they were the group most likely to reduce consumption in the future. According to the afore-mentioned study by Verbeke et al. (2010), there are signs that the healthiness of meat is gradually becoming more important for consumers than safety concerns relating to meat products.

In their study on the relationship between attitudes towards and the consumption of poultry and pork in Ireland, McCarthy et al. (2004) found that for both meats, attitudes towards healthiness, safety and taste were the most important factors influencing consumption intentions. For pork, animal welfare issues also played a role: people who were concerned about animal welfare and believed the welfare of pigs to be poor were more negative towards pork. For poultry, animal welfare issues were not significant. Environmental issues were not significant in explaining the

consumption intentions for either meat type. However, McCarthy et al. (2004) forecasted that in the future animal welfare will have a greater influence on consumption, even though in the early 2000s it appeared to play only a minor role for consumers (cf. Verbeke & Viaene 1999).

Against this background, we were interested in exploring the ways in which meat consumption and its patterns are potentially changing in Finland. In order to analyse the changes in detail, we included beef, pork and chicken as meat types and vegetables as a point of comparison. We focused on a variety of attitudinal factors identified as significant in previous research. These were healthiness, safety, price (or personal economic situation), taste preferences, animal welfare and environmental effects. In addition, we included weight management and the life situation, which are both factors included in Finnish discussion on meat consumption.

3. Data and research methods

3.1. The data

The data were gathered in March 2010 with an online questionnaire directed at consumers representative of Finnish Internet users, who were from 18 to 79 years old. Of the consumers who were contacted, 38% completed the questionnaire, yielding 1623 complete answers, while 14% of those who began answering dropped out before finishing the questionnaire.

Table 1. Descriptive statistics of the consumers in the data and in the Finnish population (www.stat.fi 2009).

	Data	Population
Proportion of females	50%	50%
Mean year of birth	1960	1963
Percentage living in the Helsinki Metropolitan Area	26%	25%
Proportion residing in each province:		
Southern Finland	41%	41%
Western Finland	36%	36%
Eastern Finland	11%	11%
Oulu	9%	9%
Lapland	3%	3%
Proportion with a lower educational level (intermediate level)	46%	59%
Proportion with a gross income of (€/year):		
0–20 000	14%	22%
20 001–40 000	30%	31%
40 001–60 000	27%	21%
60 001–90 000	17%	17%
Over 90 000	4%	9%
Proportion of one-person households	25%	39%

The gender distribution, geographical location and mean age of the respondents closely followed the population-level figures (Table 1). The educational level of the respondents was slightly higher, they earned somewhat more and they lived less often in one-person households than the population. However, overall the survey sample was highly representative of the population.

In the survey a set of questions dealt with past changes in the consumption of beef, pork, chicken and vegetables. With a three-level scale the respondents expressed their perception of whether their own consumption had decreased, remained stable or increased in the previous 2–3 years. The same

three-level scale was used to measure the respondents' future consumption intentions regarding the same meat types and vegetables.

The frequency of meat consumption was recorded using meat type-specific measures. The meat types included beef, pork and chicken. Table 2 provides the distribution of past and future changes in consumption and the current frequency of different food types as main courses.

Table 2. The stated past changes and intended future changes in meat and vegetable consumption and the current consumption level.

	<i>Proportion of consumers %</i>				
	Have increased consumption during the past 2–3 years	Have decreased consumption during the past 2–3 years	Intend to increase consumption in the next 2–3 years	Intend to decrease consumption in the next 2–3 years	Currently consume more than once a week as a main course
Beef	6	31	3	17	55
Pork	4	27	2	17	53
Chicken	31	8	12	6	66
Vegetables	44	2	42	1	31

After measuring the perceptions of consumption changes, the respondents were asked how much various factors affected the change in consumption. The reasons for change were enquired regarding both past and the future consumption. A three-level scale (not at all, somewhat, highly) was used to quantify the significance of each reason. The alternative reasons for a change in consumption were healthiness, environmental effects, safety, price or personal economic situation, life situation, taste preferences, animal welfare and weight management.

3.2. Statistical methods

To form the consumer clusters based on past and future changes in food consumption, the latent class method was applied. The idea of latent class analysis is that behind the observed variables, in our case the statements concerning changes in food consumption, unobservable classes of individuals may exist, each having their own distribution of observed variables (Magidson & Vermut 2002). This means that each latent objective class of consumers will respond differently to the statements, but homogeneously within the class.

The estimation of the latent class models relies on probabilities. In the estimation there are two goals: first, to estimate the probabilities for class membership, and second, to estimate the probabilities for the responses to the statements of food consumption given a certain class membership. The estimation of class membership can be based on only the statements concerning changes in food consumption, or on both individual characteristics and the consumption measures. In this study the individual characteristics were not included and the probability of class membership was a function of responses to the consumption measures only.

The probabilities were estimated in this study using Latent Gold 4.5. The estimation was carried out by assuming one class, then two classes, three classes and so on. Estimation based on maximising the likelihoods allows assessment of the explanatory power of the model in each step in order to decide on the optimal number of classes.

The first criterion for selection of the optimal number of clusters was the p-value. The p-value is calculated under the assumption that the L2 statistic follows a chi-squared distribution. In

determining the best model, a p-value greater than 0.05 provides an adequate fit and the model that has the lowest number of parameters is chosen. Using these criteria, the best model was a 9-class model (p-value 0.4, number of parameters 88) (Table 3). However, the interpretation of the 9-class model was too diffused, and based on the BIC and AIC criteria (e.g. Morey et al. 2006), we reduced the number of classes by selecting the 6-class solution instead of the 9-class solution. By means of the 6-class model, the L2 was reduced by 49% from the baseline 1-class model.

For cluster (class) description the sociodemographics and the consumption frequency variables were used in the latent class model as inactive covariates. This means that the effect of the chosen covariates is not included in the estimation of the model, but inactive covariates provide useful descriptive information on the cluster members.

Finally, analysis of variance was used to compare the motivations for consumption changes between the clusters.

Table 3. The results of fitting various LC models.

Model Description	BIC(LL)	AIC(LL)	Npar	L ²	DF	p-value	% reduction in L ² (H ₀)
1-class	18 281.97	18 195.69	16	3 549.37	1607	6.30E-148	0
2-class	17 492.19	17 357.39	25	2 693.06	1598	4.30E-59	-24%
3-class	17 091.48	16 908.15	34	2 225.82	1589	3.50E-24	-37%
4-class	16 996.94	16 765.09	43	2 064.76	1580	1.60E-15	-42%
5-class	16 935.27	16 654.88	52	1 936.56	1571	5.80E-10	-45%
6-class	16 870.58	16 541.66	61	1 805.34	1562	1.60E-05	-49%
7-class	16 860.72	16 483.28	70	1 728.96	1553	0.0011	-51%
8-class	16 864.99	16 439.02	79	1 666.69	1544	0.015	-53%
9-class	16 812.58	16 338.08	88	1 547.76	1535	0.40	-56%
10-class	16 890.70	16 367.67	97	1 559.34	1526	0.27	-42%
11-class	16 902.01	16 330.45	106	1 504.12	1517	0.59	-32%

4. Results

4.1. Changes in meat consumption

Based on the past changes and future intentions regarding meat and vegetable consumption, six consumer classes were identified in the latent class analysis. Table 4 presents the cluster results of the 6-class solution. The solution provides diverse cluster sizes varying between 6.9% and 48.0%. The R² values indicate the proportion of variance explained by this 6-class model to be highest for the past and future consumption changes for beef and pork. The conditional probabilities indicate the differences in consumption patterns that distinguished the clusters.

The largest cluster (48% of the respondents) was interpreted as a ‘no change in meat and vegetable consumption’ cluster. This cluster had not made any major changes in meat and vegetable consumption during the previous few years, and also the majority of respondents in this cluster had no intention to change their consumption in the future.

The second cluster (12.9%) included the respondents who had already reduced their beef and pork consumption as well as increased their chicken and vegetable consumption. This change was largely

completed and no further reduction in beef and pork consumption or increase in chicken or vegetable consumption was expected to occur. The second cluster was therefore named as ‘past change: less beef and pork’.

Table 4. Profile description and parameter estimates for the 6-class model.

	CI 1	CI 2	CI 3	CI 4	CI 5	CI 6	Wald	p-value	R ²
Cluster blocks	<i>No change</i>	<i>Past change</i>	<i>Ongoing change</i>						
Cluster Size - %	48.0	12.9	17.0	8.1	7.1	6.9			
INDICATORS									
Past Change: Beef							162.27	0.000	0.32
Consumption has decreased	0.12	0.68	0.42	0.72	0.01	0.57			
Consumption has remained stable	0.83	0.32	0.57	0.28	0.63	0.43			
Consumption has increased	0.06	0.00	0.01	0.00	0.36	0.00			
Past Change: Pork							115.85	0.000	0.37
Consumption has decreased	0.07	0.59	0.03	0.59	0.78	0.65			
Consumption has remained stable	0.88	0.41	0.87	0.40	0.22	0.35			
Consumption has increased	0.05	0.00	0.10	0.00	0.00	0.00			
Past Change: Chicken							112.00	0.000	0.29
Consumption has decreased	0.10	0.01	0.01	0.31	0.04	0.00			
Consumption has remained stable	0.76	0.40	0.49	0.66	0.70	0.13			
Consumption has increased	0.13	0.60	0.50	0.03	0.26	0.87			
Past Change: Vegetables							184.51	0.000	0.27
Consumption has decreased	0.04	0.00	0.00	0.00	0.01	0.00			
Consumption has remained stable	0.77	0.26	0.32	0.28	0.48	0.22			
Consumption has increased	0.19	0.73	0.68	0.72	0.52	0.78			
Future Consumption: Beef							169.11	0.000	0.42
Consumption will decrease	0.03	0.05	0.23	0.84	0.00	0.64			
Consumption will remain stable	0.95	0.94	0.76	0.16	0.84	0.36			
Consumption will increase	0.03	0.02	0.00	0.00	0.16	0.00			
Future Consumption: Pork							141.92	0.000	0.46
Consumption will decrease	0.03	0.07	0.03	0.71	0.52	0.75			
Consumption will remain stable	0.95	0.92	0.95	0.29	0.48	0.25			
Consumption will increase	0.02	0.01	0.02	0.00	0.00	0.00			
Future Consumption: Chicken							242.78	0.000	0.33
Consumption will decrease	0.03	0.03	0.00	0.53	0.00	0.00			
Consumption will remain stable	0.95	0.95	0.66	0.47	0.81	0.49			
Consumption will increase	0.02	0.02	0.34	0.00	0.19	0.51			
Future Consumption: Vegetables							183.55	0.000	0.41
Consumption will decrease	0.01	0.00	0.00	0.00	0.00	0.00			
Consumption will remain stable	0.85	0.71	0.16	0.24	0.29	0.11			
Consumption will increase	0.14	0.29	0.84	0.76	0.71	0.89			

The remaining clusters were all in the middle of an ongoing change. In the third cluster (17.0%), the respondents had already increased their use of chicken and vegetables and intended to increase

particularly the consumption of vegetables in the future, too. However, this would not cause a considerable reduction in pork or beef consumption. The cluster was named as ‘ongoing change: more vegetables’.

In the fourth cluster (8.1%), the consumption of beef and pork had already decreased, and the respondents intended to eat less beef and pork in the future, too. At the same time, there was an ongoing increase in the use of vegetables and a less pronounced decrease in the use of chicken. The cluster was named as ‘ongoing change: less all meat, more vegetables’.

In the fifth cluster (7.1%) there was also an ongoing change in meat consumption patterns. In contrast to all the other clusters, beef consumption in this group had to some extent increased in the past, and this group had the unique feature that some of the respondents intended to increase their beef consumption in the future. This change particularly occurred through reduction in pork consumption, but the cluster was simultaneously also increasing vegetable consumption. This group was named as ‘ongoing change: from pork to beef more vegetables’.

Similarly, the sixth cluster (6.9%) reflected an ongoing change in meat consumption patterns. This change particularly occurred as a reduction in beef and pork consumption, but the cluster was simultaneously strongly increasing its chicken meat and vegetable consumption. This cluster was named as ‘ongoing change: less beef and pork, more chicken and vegetables’.

4.2. Cluster profiles

Table 5 provides information on the dominant sociodemographic and consumption frequency characteristics of the consumers in each cluster. Table 6 presents all the reasons for changes in meat consumption in the past and in the future for which significant differences ($p < 0.1$) between the clusters were observed. The statistically significant variables included healthiness, weight management, food safety, environmental effects, taste preferences and animal welfare. The variables life situation and price or personal economic situation did not statistically differ between the clusters. Over all the clusters, the most important reason for both past and future change was healthiness. For past changes, also taste preferences were significant.

The sociodemographic background, consumption frequencies, as well as reasons for change provided us with more information to profile the clusters. The cluster that had indicated no past or future change (Cl 1) was male dominated. Consumers in this cluster reported having both beef and pork over three times a week as a main course, whereas a vegetable meal was consumed more seldom than once a month. They appeared to be meat lovers (cf. Verbeke & Vackier 2004) who were satisfied with their current consumption patterns.

The cluster (Cl 2) that had changed consumption patterns by reducing the consumption of beef and pork and increasing the use of chicken and vegetables indicated a high frequency of vegetable meals. In this cluster (Cl 2), chicken had apparently taken the place of other meats. The respondents in this female-dominated cluster were more probably of a middle educational level. The main reason for past change was healthiness but also changes in taste preferences mattered.

Among the clusters with an ongoing change in consumption patterns, consumers in the cluster that intended to increase vegetables but not reduce meat in the diet (Cl 3) were particularly adult households from lower income classes. They ate meat-based meals rather often and compared to other classes had no strong reasons for the change. As they were not intending to reduce their

consumption of meat while increasing that of vegetables, it is possible that they might have intended to control carbohydrates instead.

Table 5. The dominant sociodemographic characteristics and consumption profiles in the six clusters.

Cluster blocks	No change	Past change	Ongoing change			
Clusters	Cl 1	Cl 2 less beef and pork, more chicken and vegetables	Cl 3 more vegetables	Cl 4 less all meat, more vegetables	Cl 5 from pork to beef, more vegetables	Cl 6 less beef and pork, more, more chicken and vegetables chicken
Dominating characteristics						
Gender	Male	Female	-	Female	-	Female
Educational level	Low	Middle	Middle	High	High	Middle
Household income level	-	-	Lower	Upper middle	-	-
Household structure	-	-	Adult household	Single household	-	Adult household
Beef: times / week or month*	>3/week	<1/month	1–2/week	never	>3/week	<1/month
Pork: times / week or month*	>3/week	< 1/month	1–2/week	< 1/month	< 1/month	< 1/month
Chicken: times /week or month	never	>3/week	1–3/ month	< 1/month	1–3/ month	>3/week
Vegetables: times / week or month*	never	1–2/week	1–2/week	>3/week	1–3/month	1–2/week

* As a main course

The respondents in the fourth cluster (Cl 4, less all meat) were also female dominated. The respondents with higher education and income were over-represented. In their consumption patterns, vegetable meals were already a typical choice: many never ate beef and rarely ate chicken and pork. They had multiple and strong reasons for the change. Compared to other classes they considered healthy reasons to also be important for their future consumption. Consumers in this cluster considered animal welfare and environmental effects to be more important than consumers in any other cluster.

The cluster that was reducing pork consumption (Cl 5) also had a variety of less strong reasons for this change. These highly educated consumers already ate pork relatively seldom, but the frequency of beef meals was high. The cluster that intended to replace beef and pork with chicken and vegetables (Cl 6) had strong health reasons, but also animal welfare and environmental reasons for the intended change. They already ate seldom other meats than chicken. These female dominated consumers were more likely to be from adult households.

Table 6. The reasons for changes in consumption that differ significantly ($p < 0.1$) between the clusters (analysis of variance).

Cluster blocks	No change	Past change	Ongoing change			
Clusters	Cl 1	Cl 2 less beef and pork, more chicken and vegetables	Cl 3 more vegetables	Cl 4 less all meat, more vegetables	Cl 5 from pork to beef, more vegetables	Cl 6 less beef and pork, more chicken and vegetables
Importance of the reason for consumption change, mean, scale 1 (not all all) – 3 (highly important)						
Past						
Healthiness		2.42	2.47	2.57	2.42	2.52
Environmental effects		1.67	1.65	2.12	1.59	1.69
Food safety		1.61	1.71	1.75	1.73	1.73
Taste preferences		2.39	2.29	2.29	2.30	2.38
Animal welfare		1.63	1.59	2.12	1.67	1.74
Weight management		2.05	2.08	1.98	1.98	2.17
Future						
Healthiness			2.62	2.65	2.45	2.66
Environmental effects			1.88	2.29	1.79	1.93
Animal welfare			1.82	2.32	1.89	1.97
Weight management			2.21	2.04	2.17	2.32

4.3. Cluster blocks

These six clusters can be summarized with three larger blocks, each representing a different type of change in meat and vegetable consumption patterns. The first block (48%) was a ‘no change’ block, in which there had been no substantial consumption changes in the past, and neither were there indications of major changes taking place in the future. The second block (Cl 2) can be termed a ‘past change’ block (17%) in which consumption of beef and pork had already decreased and consumption of chicken and vegetables had increased, but no significant changes were expected in the future. The third block (Cl 3-6) was named ‘ongoing change’ (39%), because consumption habits had already started to change and were expected to continue to do so in the future. However, it is noteworthy that the patterns of change in this block were taking very different forms and directions. The shared feature of these changes was that vegetable consumption was increasing in all four clusters within this block. The differences were in the respective directions of beef, pork and chicken consumption.

5. Discussion and conclusion

In this study, we examined changes in meat consumption and the reasons for these changes by asking a representative sample of Finnish consumers about the changes in meat consumption they had made in the past few years and the changes that they intended to do in the next couple of years. Furthermore, we analysed the stated reasons for the changes and the sociodemographic differences in the consumer groups that we identified by means of latent class analysis. Here it is to be noted that the study is based on self-reported data, i.e., the results of the study may not be in line with actual consumption data. However, the results do reveal how people themselves see the evolvement of their food consumption patterns and the role that various societal discussions and personal preferences play in this evolvement.

According to the previous literature there is considerable heterogeneity among consumers in their attitudes toward meat consumption and meat attributes. This study demonstrated that the heterogeneity also extends to the intentions to change meat consumption patterns and to the reasons for these changes. The results revealed that a large proportion of the respondents, 48%, had established meat and vegetable consumption patterns that they were not planning to change. However, 52% of the respondents reported that they had changed their eating patterns during the

past few years or were in the middle of an ongoing change. Generally, this change meant increasing the consumption of vegetables and reducing the use of meat. However, when examined in detail, the changes took differing directions, indicated by the fact that the analysis produced six clusters with distinctive features regarding the consumption of different meat types and vegetables as well as sociodemographic backgrounds and reasons for change. This finding is consistent with observations from studies of food and eating during the past few decades of the increasing fragmentation and diversification of food consumption patterns (e.g., Warde 1997, Grunert 2006, Halkier 2010).

The results indicate that many participants were in the process of changing their eating patterns, and that the changes were related to the current debates around the healthiness, sustainability and ethics of the present omnivorous diet. However, it seems that relatively few people were planning to completely stop eating meat. Instead, many were planning to cut down the amount or the variety of meats eaten. In addition, our results suggested that there was a group of people who had already reduced their meat consumption in the past and did not plan any further changes. The considerably larger proportion of those respondents who were planning to change their consumption patterns compared to those who had already carried out a change may on one hand imply that major changes are forthcoming. On the other hand, projections into the future are always more uncertain than reflections on the past, and it may well be that not all intentions will materialize as actual changes in consumption practices.

The results demonstrate that some socio-demographic characteristics of consumers differentiate the consumer clusters from each other. For instance, in the cluster with established consumption patterns there were more men than women, whereas in all the other clusters the gender distribution was either even or female dominated. In general, however, even though sociodemographic backgrounds differentiated the clusters, the differences were not very systematic when considering the three larger blocks with no, past or ongoing change.

A general trend among almost all the respondents who were in the middle of a change in food consumption was the expressed intention to eat more vegetables in the future. This can probably be seen as a sign of the ideal of eating a healthy diet. Indeed, healthiness was one of the most salient stated reasons for changing consumption habits. This supports the observation by Verbeke et al. (2010) that for consumers, healthiness of meat is gradually overtaking safety concerns. The results indicate that healthiness provides a reason to reduce the use of meat, but other motivations also play a role in specifying the structure of the change. For instance, when animal welfare was a central concern, the reduction took place also in the use of chicken.

Alongside healthiness, weight management gained a prominent place as one of the important reasons for change. The two factors were related, although the strength of the relation varied in different consumer groups. In general, those who wanted to eat healthily also wished to keep their weight in control. Weight management was an important reason for change particularly in those groups that had reduced their use of beef and pork and increased that of chicken. As previous studies have not considered the importance of weight management in relation to meat consumption, it is difficult to assess the extent to which weight concerns may also play a role in the use of meat in other countries.

In recent research on meat consumption it has been suggested that even though people as citizens express environmental and animal welfare-related concerns in relation to meat production, they are not very well channelled into the choices that people make as consumers (e.g. Hoogland et al. 2005, Mayfield et al. 2007, Verbeke et al. 2010). Korzen and Lassen (2010) suggest that the ‘everyday context’ of buying, preparing and eating meat is different from the ‘production context’ of producing the meat; and these “different contexts make different rationalities applicable” (ibid.,

280). In other words, the focus on everyday food practices encourages people to think of meat from a particular frame of reference, such as health, price or family taste preferences, which often excludes other framings, such as thinking of the conditions in which the animals live. In our study, we identified a segment of consumers (8.1%) who had changed and intend to change their consumption patterns particularly for environmental and animal welfare reasons.

To conclude, our findings contribute to the recent discussion on the respective roles of individual or consumer concerns vis-à-vis societal or citizen concerns over food production and consumption. Taste preferences and health reasons are the most important reasons for consumers changing their meat eating patterns, but the results of this study demonstrate that there are also signs that new, more citizen-oriented perspectives are gradually gaining strength regarding meat consumption. This will present future challenges to all actors involved in meat production and consumption.

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References

- Beardsworth, A., & Bryman, A. (2004). Meat consumption and meat avoidance among young people. *British Food Journal*, 106, 313–327.
- European Commission (2005). Attitudes of consumers towards the welfare of farmed animals. *Special Eurobarometer* 229.
- Fiala, N. (2008). Meeting the demand: An estimation of potential future greenhouse gas emissions from meat production. *Ecological Economics*, 67, 412–419.
- Fiddes, N. (1991). *Meat. A natural symbol*. London: Routledge.
- Fresco, L. O. (2009). Challenges for food system adaptation today and tomorrow. *Environmental Science & Policy*, 12, 378–385.
- Frewer, L. J., Kole, A., van de Kroon, S. M. A., & de Lauwere, C. (2005). Consumer attitudes towards the development of animal-friendly husbandry systems. *Journal of Agricultural and Food Ethics*, 18, 345–367.
- Glitsch, K. (2000). Consumer perceptions of fresh meat quality: cross-national comparison. *British Food Journal*, 102, 177–194.
- Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector – a review. *Meat Science*, 66, 259–272.
- Grunert, K. (2006). Future trends and consumer lifestyles with regard to meat consumption. *Meat Science*, 74, 149–160.
- Guenther, P. M., Jensen, H. H., Batres-Marquez, P., & Chen, C.-F. (2005). Sociodemographic, knowledge, and attitudinal factors related to meat consumption in the United States. *Journal of the American Dietetic Association*, 105, 1266–1274.
- Halkier, B. (2010). *Consumption challenged. Food in medialised everyday lives*. Farnham and Burlington: Ashgate.
- Harper, G. C., & Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. *British Food Journal*, 104, 287–299.
- Helakorpi, S., Laitalainen, E., & Uutela, A. (2010). *Suomalaisen aikuisväestön terveyskäyttäytyminen ja terveysterveys*, kevät 2009. [Health behaviour and health among the Finnish adult population, Spring 2009.] Report 7/2010. Helsinki: Terveysterveys ja hyvinvoinnin laitos / National Institute for Health and Welfare.

- Korzen, S., & Lassen, J. (2010). Meat in context – on the relation between perceptions and contexts. *Appetite*, 54, 274–281.
- Korzen, S., Sandøe, P., & Lassen, J. (2011). Pure meat – public perceptions of risk reduction strategies in meat production. *Food Policy*, 36, 158–165.
- Krystallis, A., Chrysoschoidis, G., & Scholderer, J. (2007). Consumer-perceived quality in 'traditional' food chains: The case of Greek meat supply. *Appetite*, 48, 54–68.
- Mahon, D., & Cowan, C. (2004). Irish consumers' perception of food safety risk in minced beef. *British Food Journal*, 106, 301–312.
- Mayfield, L. E., Bennett, R. M., Tranter, R. B., & Woolridge, M. J. (2007). Consumption of welfare-friendly food products in Great Britain, Italy and Sweden, and how it may be influenced by consumer attitudes to, and behaviour towards, animal welfare attributes. *International Journal of Sociology of Food and Agriculture*, 15, 59–73.
- McCarthy, M., O'Reilly, S. O., Cotter, L., & de Boer, M. (2004). Factors influencing consumption of pork and poultry in the Irish market. *Appetite*, 43, 19–28.
- McEachern, M. G., & Schröder, M. J. A. (2002). The role of livestock production ethics in consumer values towards meat. *Journal of Agricultural and Environmental Ethics*, 15, 221–237.
- McIlveen, H., & Buchanan, J. (2001). The impact of sensory factors on beef purchase and consumption. *Nutrition & Food Science*, 31, 286–292.
- Morey, E., Thacher, J. and Breffle, B.(2006). Using angler characteristics and attitudinal data to identify environmental preference classes: A latent class model. *Environmental and Resource Economics*, 34, 91–115.
- Saarnivaara, P., Saikkonen, R., Kallinen, A., Heikkilä, E., & Tapionlinna, U.-R. (Eds.) (2009). *Ruokatietoa 2009*. [Food information 2009.] In Finnish. Espoo: Suomen Gallup Elintarviketieto.
- Steinfeld, H., Gerber, P., Wassenaar, T., Castel, V., Rosales, M., & de Haan, C. (2006). *Livestock's long shadow. Environmental issues and options*. Rome: Food and Agriculture Organization of the United Nations. Available at: <ftp://ftp.fao.org/docrep/fao/010/a0701e/A0701E00.pdf> (24.6.2009)
- Tike (2010). Balance sheet for food commodities 2008 and 2009 (preliminary). Helsinki: Tike – Information Centre of the Ministry of Agriculture and Forestry.
- Twigg, J. (1983). *Vegetarianism and the meanings of meat*. In: A. Murcott (Ed.) (1983). *The sociology of food and eating. Essays on the sociological significance of food* (pp. 18–30). Aldershot: Gower Publishing.
- Vanhonacker, F., Verbeke, W., van Poucke, E., & Tuytens, F. A. M. (2007). Segmentation based on consumers' perceived importance and attitude toward farm animal welfare. *International Journal of Sociology of Food and Agriculture*, 15, 84–100.
- Verbeke, W., & Viaene, J. (1999). Beliefs, attitude and behaviour towards fresh meat consumption in Belgium: empirical evidence from a consumer survey. *Food Quality and Preference*, 10, 437–445.
- Verbeke, W., & Vackier, I. (2004). Profile and effects of consumer involvement in fresh meat. *Meat Science*, 67, 159–168.
- Verbeke, W., Pérez-Cueto, F. J.A., de Barcellos, M. D., Krystallis, A., & Grunert, K. G. (2010). European citizen and consumer attitudes and preferences regarding beef and pork. *Meat Science*, 84, 284–292.
- Verbeke, W., Pérez-Cueto, F. J. A., & Grunert, K. G. (2011). To eat or not to eat pork, how frequently and how varied? Insights from the quantitative Q-PorkChains consumer survey in four European countries. *Meat Science*, 88, 619–626.
- Vinnari, M., & Tapio, P. (2009). Future images of meat consumption in 2030. *Futures*, 41, 269–278.
- Warde, A. (1997). *Consumption, food and taste. Culinary antinomies and commodity culture*. London: SAGE Publications.
- Yen, S., Lin, B. -H., & Davis, C. G. (2008). Consumer knowledge and meat consumption at home and away from home. *Food Policy*, 33, 631–639.

Yeung, R. M. W., & Morris, J. (2001). Consumer perception of food risk in chicken meat. *Nutrition & Food Science*, 31, 270–278.

Yeung, R. M. W., & Yee, W. M. S. (2002). Multi-dimensional analysis of consumer-perceived risk in chicken meat. *Nutrition & Food Science*, 32, 219–226.

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