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Do defaults matter? Willingness to pay to avoid GM food vis-à-vis organic and conventional food in Denmark, Great Britain and Spain.

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Abstract of the paper (no more than 200 words)

The introduction and communication of new technologies in the food industries has given rise in the past to some scientific uncertainty that hampers informed choice. Here we draw upon the case of Genetically Modified (GM) technology and, in particular, on different types of GM food, to investigate consumers' behavioural reactions to GM food as well as their willingness to pay for avoiding GM food in three EU countries, Denmark, GB and Spain in 2007. Our unique contribution lies in that our empirical analysis concerns two food products containing different characteristics. In particular, we compare consumers' reactions to cornflakes (to represent a processed food) and tomatoes (to represent a 'fresh' food) juxtaposed with GM and conventionally produced food. Our results reveal that, although GM food is the least preferred

production process (vis-à-vis organic or conventional food), consumers can be divided into two groups depending on their preferences for organic food. Namely, a first group is made up of GB and Spain where consumers are willing to pay a small, or modest, premium over the respective market average price, and a second group is that of Denmark where consumers' willingness to pay is significantly larger. Although risk is an influential characteristic, risk rankings indicate that GM food is perceived as less risky than irradiation, artificial growth hormones in food or pesticides used in the production process.

Keywords: Genetically modified food, consumer behaviour, choice models, Denmark, Great Britain and Spain.

1. Introduction

New technologies influence people's decision making behaviour and those of society in general (e.g. cooking, socialising patterns, etc). The introduction of new technologies in the food industries has revolutionized the economic efficiency of food production (Falck-Zepeda et al., 2000, Moschini et al., 2000, Alston et al., 2002), but has also exerted important demand side effects that cannot be dismissed. Changes arise through new processes and the invention of novel products, often improving some lifestyle dimensions but also making some others worse. In many cases, the full costs are undefined. This is because new technologies, such as Genetically Modified (GM) food, are associated with scientific uncertainty given that not all the social and individual consequences of their adoption are fully known either by consumers themselves or by policy makers. In order to determine the limits of technology dissemination and transfer, it becomes a priority to examine consumers' technology acceptance. While it is clear that there is some degree of resistance to the introduction of GM food worldwide, it seems that the extent of this resistance varies from country to country and over time (Costa-Font et al., 2008).

The subject of GM food has been of particular interest in the European Union (EU) due to the long *de facto* moratorium against the importation of GM food that ended in 2005. Currently, while new transformation events of maize and other crops are being authorised in the EU, the debate still remains as to what extent individuals and their surrounding cultural society value these GM food products, whether they perceive that they might convey any risks and/or benefits to their health and the environment and, of course, whether the development of biotechnology in food products will continue to remain a controversial subject.

Even though there is a growing body of literature on consumers' level of acceptance of GM food, and especially on helping policy makers on how to develop coexistence measures (see Messéan et al., 2009), little effort has, so far, been given to comparisons between EU countries in order to make recommendations regarding the introduction of GM foods. Furthermore, a distinction between processed and fresh products must be

considered. In this paper, after briefly reviewing previous research on consumer behaviour and GM food, we demonstrate the use of a choice experiment model to examine the formation of social attitudes towards GM and organic food in Denmark, GB and Spain. Spain is one of the few European countries that currently produce agricultural biotechnology products, with about 0.1 million hectares of GM maize being grown (James, 2009). We answer some well-determined questions, namely: whether consumers in the EU are willing to accept GM food; whether they are willing to pay a premium for non-GM food over GM food; and the extent to which 'subjective knowledge' and available information regarding the possible safety and public health effects of consuming GM foods affects their decisions. Furthermore, given that market research studies have focused on the examination of relevant attributes influencing individuals' product acceptance, we specifically examine what the significant attributes are which appear to be the most influential in directing consumers' food purchasing behaviour.

2. Previous research: consumer behaviour towards GM food

Choice experiment (CE) literature in the field of food marketing research studies have focused on food safety and novel foods, such as GM foods. Indeed, it has been confirmed through CE that the concern about food safety is a key issue in consumers' food purchase decisions. This concern has been revealed in different fields such as: pesticide risk exposure (Florax et al., 2005); hormone-treated beef (Alfnes, 2004); food safety inspection and 'quality and safety' labelling for the meat sector (Loureiro and Umberger, 2007 and Enneking, 2004); GM presence in food (Burton and Pearse, 2002); and GM labelled food (Carlsson et al., 2007), amongst others.

Burton and Pearse (2002) examined Western Australian attitudes towards GM beer with either an associated lower cost of brewing (GM first generation) or, increased antioxidants (medical benefits). They concluded that consumers are divided into three groups regarding GM presence in beer. A first group of respondents were not prepared to select a GM beer at any price. A second group would require some price discount to purchase a beer with first generation GM involved and, finally, a third set placed a premium on GM beer with medicinal benefits. This Australian consumers' divide regarding GM food purchase was also confirmed by James and Burton (2003). They

revealed that some respondents required an infeasible discount to consume GM foods for, whereas two thirds were prepared to consume GM foods under certain conditions, one third were not prepared to pay any premium at all to avoid GM foods. A further study was performed by Rigby and Burton (2006) in the UK with a conclusion that a segment of the UK market (from 5-24%) may be prepared to buy GM food at discounts of up to 10%, whereas an additional market share gained by further discounting would be small.

A further important determinant of consumers' attitudes towards GM food was revealed by Burton et al. (2001), James and Burton (2003) and Onyango et al. (2004) who noticed that attitudes towards GM food are related to the type of genes involved in the modification. In fact, as mentioned above, Onyango et al. (2004) measuring US consumers' preferences for GM food (bananas), showed that genetic modification involving animal genes, bacterium and plant genes had a negative effect on choice, and that compensation was required to include acceptance of processes involving animal, bacterium and plant genes, in that order. Conversely, if the GM bananas were a result of own gene transfer, consumers were willing to pay 3% more for the product. Analogously, Burton et al. (2001) revealed that UK consumers were more concerned with the use of animal genes in GM technology than plant genes and that this was a significant determinant of their choice. In addition, James and Burton (2003) concluded that Australians are more willing to accept GM food production if animal genes are not included in that technology. Finally, another important conclusion of the Burton et al. (2001) analysis is that attitudes towards organic food were found to be a useful indicator of attitudes towards GM technology. In fact, consumers concerned with organic food considered the use of plant genes in GM technology as a significant determinant of their choice, whereas unconcerned consumers were indifferent to this attribute. In contrast, almost all consumers consider the use of animal genes in GM technology as a significant determinant in their choice.

The empirical literature on the issue covered in the study reported here also shows some consensus when identifying significant individual-specific characteristics for determining attitudes towards GM technology. Burton et al. (2001) and James and Burton (2003) noticed that gender significantly affects preferences for GM food. Moreover, Burton and Pearse (2002) and James and Burton (2003) found that the age of

the respondent also was a significant modifier of attitudes. Finally, Burton and Pearse (2002) found that concerns about cholesterol level affect consumers' preferences for GM food. Therefore, the attitude of any individual towards a GM food product is determined by both attributes attached to that individual such as age, level of education, present knowledge of GM technology, cultural background and religion among others (Costa-Font and Mossialos, 2005; Hossain et al., 2002 and 2003; Veeman et al., 2005, etc.), as well as the 'value set' of the individual and the manner in which they order and rank their individual personal life priorities (Bredahl et al., 1998; Moon and Balasubramanian, 2001 and 2004; Grunert et al., 2003; Onyango, 2004; and Hossain and Onyango, 2004; Frewer et al., 1998, among others).

Regarding knowledge, there appears to be a direct and positive relationship where an individual who increases their knowledge of GM technology also appears to increase their support of GM applications (Boccaletti and Moro, 2000; Moon and Balasubramanian, 2001 and 2004; Moerbeek and Casimiv, 2005; and Vilella-Vila et al., 2005). As such, it is instructive to differentiate between the 'objective knowledge' presently held by individual consumers, which can be defined as the 'real' substantive knowledge they may have about GM food, and their 'subjective knowledge', which refers essentially to what they think they know about GM food (Lusk et al. 2004; House et al. 2004). These studies focus on the role of subjective knowledge where directly associated to consumer acceptance due to its role in directing information seeking (House et al. 2004 and Lusk et al. 2004).

The extent to which consumers trust the source of information that supplies and propagates information about GM products is a key element in consumer acceptance of biotechnology. There is some evidence that suggests that, when individuals are presented with information detailing a positive benefit of consuming a GM food product such as an environmental or health benefit, they then modify, to some extent, their valuation of non-biotech foods relative to GM foods (Loureiro and Bugbee, 2005). Although consumers appear to prefer GM products to be associated with a benefit(s), that benefit does not, however, necessarily imply a willingness to pay a premium for the GM product such as GM food. The perceived risk(s) associated with GM food products appear to have a negative impact on consumers' willingness to accept GM food.

Finally, the analysis of consumers' willingness to pay for GM food was also examined from the labelling standpoint. Particularly, Onyango et al. (2004) and Carlsson et al. (2007) examined USA and Swedish consumers' willingness to pay for GM products, respectively, under a particular labelling regime. Onyango et al. (2004) conclude that a positive mean willingness to pay was associated with the following labelling statement: 'contains no genetically modified corn'; 'USDA approved genetically modified corn'; and 'corn genetically modified to reduce pesticide residues in food'. In contrast, consumers will require a discount for the statement 'may contain GM corn' and 'contains genetically modified corn'. A more generalised picture is obtained by Carlsson et al. (2007) who reveal that Swedish consumers were willing to pay a significantly higher premium to ensure a total ban on the use of GM in animal fodder. However, there is no significant difference in wtp between a ban on GM content and a labelling scheme. In fact, this last outcome is consistent with the findings of Enneking (2004) who showed that German consumers were willing to pay a price premium of up to 20% for those products marketed with a label indicating food safety by means of a 'quality and safety' label.

All in all, it can be concluded that, worldwide, most consumers relate GM food to a negative impact on their personal utility, and there is some degree of resistance to the introduction of GM food worldwide (see, for example, Bredahl, 2001; Grunert et al., 2003). Consumers are willing to pay a premium for non-GM food and, therefore, place a higher value on non-GM food relative to GM food. The extent of that resistance varies from country to country and over time (Gaskell et al., 2003; Gaskell et al., 2004; Gaskell, 2006; Lusk et al., 2002; Onyango et al., 2004, among others). Present evidence suggests that European consumers are more willing to pay a higher price for non-GM foods than are their North American counterparts (Lusk et al., 2004; Jaeger et al., 2004). However, there is a real need for a comparison between different EU countries; this paper reports on an attempt to do this.

3. Methodology: Choice Experiments (CE) and Willingness to Pay (WTP)

As mentioned above, CE was used as the framework to estimate the relative importance of GM, non-GM and organic food for consumers in different European countries. This

method allows individuals to select among several alternative options, where each option is characterised by a number of attributes with different levels (Burton et al., 2001). Indeed, discrete choice experiments are based on the premise that a good can always be portrayed by its characteristics or attributes. Moreover, it is also established by the Lancaster consumer theory (Lancaster, 1966), which states that goods are selected by consumers, either singly or in combination, based on their characteristics, with these being the source of consumers' utility (Louviere et al., 2000). As the random utility theory states (MacFadden, 1974), individuals will choose the alternative, among a set of alternatives, that generates the highest utility.

Thus, the individual q 's utility associated with the choice of alternative i (U_{iq}), comprises two separate utilities: a deterministic or observable component V_{iq} and an unobservable or random component ε_{iq} (the random error). There are as many equations as alternatives in the choice set. Therefore, it can be defined as a choice of $j = 1, \dots, i, \dots, J$ alternatives, where J is the number of available alternatives in the choice set faced by an individual:

$$U_{iq} = V_{iq} + \varepsilon_{iq}, \quad (1)$$

The key assumption is that individual q will choose alternative i if and only if:

$$U_{iq} > U_{jq} \text{ all } j \neq i \in A \quad (2)$$

The probability of an individual q choosing alternative i will be higher if its associated utility is chief among the different choices (Loureiro et al., 2007), that is:

$$P_{iq} = \Pr ob(U_{iq} \geq U_{jq}) \forall j \in j = 1, \dots, J; i \neq j \quad (3)$$

Taking (1) into account, equation (3) can be expressed as:

$$P_{iq} = P[\varepsilon_{jq} < V_{iq} - V_{jq} + \varepsilon_{iq}, \quad \forall j \in j = 1, \dots, J; j \neq i] \quad (4)$$

Discrete choice analysis distribution assumes that the random elements in utility (ε_{iq}) are independent across alternatives and are identically distributed (IID) (Maddala, 1997):

$$P(\varepsilon_j \leq \varepsilon) = \exp(-\exp(-\varepsilon)) = e^{-e^{-\varepsilon}} \quad (5)$$

Therefore, the probability of choosing alternative i , (P_i), out of the set of J alternatives, may be written as:

$$P_i = \frac{\exp(V_{iq})}{\sum_{j=1}^J \exp(V_{jq})} \quad (6)$$

This leads to the use of the basic choice model, named the conditional logit choice or conditional multinomial logit (MNL) model. The statistical estimation procedure to generate the population parameters from the observed sample is maximum likelihood estimation:

$$L^* = \sum_{q=1}^Q \sum_{j=1}^J f_{jq} \ln P_{jq}, \quad (7)$$

where $f_{iq} = 1$ if alternative j is chosen and $f_{iq} = 0$ otherwise.

It is also important that the specified model does not consider respondents' heterogeneity, since it fails to incorporate information about demographic variables, knowledge or behaviour (SDC) (Burton et al., 2001 and Hensher et al., 2005). To incorporate these variables leads us to define equation (8):

$$V_i = \beta_{oiq} f(X_{1iq}) + \beta_{2iq} f(X_{2iq}) + \dots + \beta_{kiq} f(X_{kiq}) + \alpha_{1qi} f(S_{1q}) + \alpha_{2qi} f(S_{2q}) + \dots + \alpha_{nqi} f(S_{nq}) \quad (8)$$

Where α_{nqi} is the weight for the n th SDC for alternative i for person q and S_{nq} is some measurement of the associated n th SDC for person q .

4. Research Design:

4.1 The sample

The survey was conducted in spring 2007 on 302 Danish respondents, 352 British respondents and 314 Spanish respondents. In order to ensure that the final sample in each country was representative, the sample was stratified on the basis of a number of key dimensions that were known to affect attitudes to GM technologies and food purchasing patterns. These dimensions were: Respondent age, Household income and Region. Quotas were imposed to ensure a representative spread of respondents over these dimensions. Household income categories were set separately for each study country using five income categories. The central category was positioned to capture average household incomes in each country. In addition to the three stratification variables, respondents were also screened on two other dimensions, by means of questions asked at the outset of the interview. First, the respondent was required to be the primary food purchaser of their household and, second, respondents had to purchase

both the study products i.e. cornflakes and tomatoes. It was recognised at the outset that constraining the sample to primary food purchasers would lead to gender bias in the final sample, as most household food purchasers are women. However, this was felt acceptable in order to ensure that respondents were as knowledgeable as possible about their household's food preferences as well as prevailing market prices. The survey was carried out by a professional market research company (Accent Ltd) who were based in the UK. Table 1 shows the demographic characteristics of the respondents by study country.

Table 1: Socio-demographic characteristics by study country

Characteristic	Levels	% of total				
		ES	GB	DE		
Income level (currency/year) *1000	ES:<7	GB: 4.8-14.4	DE: <18; 18	5	29	23
	ES:7-22	GB: 14.4-24	DE: 18-36	45	20	23
	ES:22-37	GB:24-33.6	DE: 36-54	35	20	13
	ES:37-52	GB: 33.6 48	DE: 54-72	11	15	25
	ES:>52	GB: >48	DE: >72	4	16	16
Age	18-25			24	19	24
	26-40			26	29	33
	41-65			28	37	26
	>65			22	15	17
Gender	Male			20	29	34
	Female			80	71	66
Level of eduction	Primary school			34	40	17
	High school			37	34	48
	University			24	25	35
	Not stated			5	1	0
Children in school/nursery	No			60	58	58
	Yes			40	42	42

4.2 The survey

The nature and complexity of the data that had to be collected by the survey, together with the amount of information that it was necessary to transmit to respondents to enable them to give informed answers, precluded the use of postal and telephone data collection methodologies. Thus, a face-to-face, on-street methodology was chosen in order to obtain a representative sample of shoppers in Denmark, GB and Spain.

Two choice-modelling experiments were performed within the survey reported here, one analysing cornflakes and the other analysing tomatoes. The first step of the study was the selection of product attributes, which was completed taking into account the most relevant parameters associated with the product in order to define a realistic good. To do so, a pilot questionnaire survey was performed in each country and next, consultation with stakeholders through formal interviews. Finally, two choice-modelling experiments, each with three product attributes were defined. On the one hand, price, production technology and product functionality were used for the cornflakes experiment design. Alternatively, for the tomato case, price, production technology and location of origin were employed. Table 2 shows the details of the two choice experiments carried out. Some details explaining the implications of health and environmental benefits of GM food were presented to respondents on a separate sheet at the time of interview (see Annex 1).

Table 2: Attributes and attribute levels for the two choice experiments

Cornflakes		Tomatoes	
Attribute	Level	Attribute	Level
Production technology	Conventional, Organic, GM health benefits, GM environmental benefits	Production technology	Conventional, Organic, GM health benefits, GM environmental benefits.
Price (per 500g)	GB: 0.7, 1.3, 2.00, 2.50 £ DK: 16, 30, 42, 54 DK ES: 1.00, 2.00, 2.80 , 3.50 €	Price (per 1kg)	GB: 0.7, 1.4, 2.00, 2.50 £ DK: 16, 32, 43, 56 DK ES: 1.00, 2.00, 2.70 , 3.50 €
Product functionality	Regular, low carbohydrates	Origin	Imported, Locally produced

The already defined level combinations and the decision to construct a main effect design, with three choices in each choice set, led us to reach a 100% efficient design (see Table 3 with all the choice set combinations). The decision to use a main effects design without considering the interaction effects is based on a trade-off between simplicity and efficiency. That is, on the total explained variance reached by the type of effect considered and the number of choice sets associated with that design. It has been shown that, in general, main effects explain up to 80% of the model variance, whereas interaction effects explain an additional 2-3% (Louviere et al., 2000). In addition, this 2-3% of additional variance explained is associated with an increase in the number of choice sets to obtain and, also, efficient experimental design.

To construct the main effect model, a fractional factorial design generation was used giving a total of 16 alternatives (orthogonal main effects design employing the SPSS statistical package), since a full factorial design would need too many combinations for the resources available. Each respondent was asked to select between first, three alternatives plus a non option within a choice set (see Table 3). Moreover, to avoid respondents tiring, the 16 choice sets were split into two groups (blocking). Therefore, each respondent was asked to complete 8 randomly selected choices for each product – two products per respondent (cornflakes and fresh tomato) (Louvier et al., 2000). An example of the version used in GB is at Annex 2.

Table 3. Final fractional factorial design for the choice experiments

	Choice sets	Option 1			Option 2			Option 3			Option 4		
		A1	A2	A3	A1	A2	A3	A1	A2	A3	A1	A2	A3
Block 1	Choice 1	0	1	1	3	0	0	1	2	0	Non option		
	Choice 2	2	1	0	1	0	1	3	2	1			
	Choice 2	3	0	0	2	3	1	0	1	1			
	Choice 4	1	0	1	0	3	0	2	1	0			
	Choice 5	2	0	1	1	3	0	3	1	0			
	Choice 6	1	2	1	0	1	0	2	3	0			
	Choice 7	2	3	0	1	2	1	3	0	1			
	Choice 8	2	2	1	1	1	0	3	3	0			
Block 2	Choice 9	0	2	0	3	1	1	1	3	1	Non option		
	Choice 10	0	3	1	3	2	0	1	0	0			
	Choice 11	3	3	1	2	2	0	0	0	0			
	Choice 12	0	0	0	3	3	1	1	1	1			
	Choice 13	1	3	0	0	2	1	2	0	1			
	Choice 14	1	1	0	0	0	1	2	2	1			
	Choice 15	3	2	0	2	1	1	0	3	1			
	Choice 16	3	1	1	2	0	0	0	2	0			

A: attributes (A1: Price; A2: Production technology; A3: Product functionality/country of origin)
0,1,2 : attribute levels.

In addition to the choice-modelling questions, the survey also had to include attitudinal and risk/benefit questions as well as other socio-economic and demographic questions in order to examine how the respondents' heterogeneity influenced consumer choice.

5. Results

5.1. Knowledge, Attitudes and Risk

Respondents were asked how well informed they were about genetic engineering in food production. It was found that consumers in Denmark rated themselves as more well-informed on such GM issues as compared with those in Spain.

Respondents ranked the most important sources that they trusted to provide reliable information on genetic engineering in food production. Overall, university scientists and consumer groups together were the most trusted. However, when national differences were examined, it was found that whilst consumers in GB and Spain tended to trust the EU and their own national governments to provide reliable information on GM foods, those in Denmark preferred consumer and environmental groups for the provision of such information and had the highest level of trust in consumer organisations.

To try to measure attitudes to GM technology, respondents were given a number of statements expressing a range of views on the GM issue, and asked how much they agreed with them. It was found that consumers in Denmark thought eating GM foods might harm them more than did those in GB and Spain. However, at least 40% of consumers in each study country expressed strong agreement with the statement that they wanted to have choice over whether they eat GM food.

Relatively few consumers in each study country agreed strongly with the statement that GM technologies will lead to both healthier and cheaper food. Just over 10% of consumers in GB and Spain strongly agreed that growing GM foods will harm the environment. But, in Denmark, more than twice this proportion of consumers felt this way.

Amongst the study countries, Danish consumers spent the most on organic products and consumers in GB and Spain were less likely to buy organic food.

Respondents were asked a series of attitudinal questions about organic products and farming methods. Only between 15 and 25% of consumers in each country were in strong agreement with the statement that 'organic products taste better than conventional'. Around 18% of consumers in each country strongly thought that organic products were too expensive; this view was especially held by British consumers. At least 35% of consumers in each study country strongly agreed that they were concerned

about harmful chemical residues in food; in Denmark half those surveyed thought this way.

Consumers' attitudes to risk were tested using a series of attitudinal questions which asked respondents to indicate what they perceived was the level of risk to human health associated with a range of seven food production technologies. In each study country, pasteurisation was regarded as the food production technology with the lowest risk, with GM technology being regarded as the technology with the next lowest risk.

Pesticides, artificial growth hormones in animals and irradiation of foods were regarded as especially high risk by between 70 and 90% of consumers in all study countries. Artificial flavours and colours and artificial preservatives were regarded as very high and high risk by about the same proportion of respondents in each study country.

5.2 Findings from the choice experiment

Results obtained from the empirical models are presented in Table 4 and 5. The LR test values show that the models are statistically significant at conventional critical levels, that is, the joint hypothesis that β_s parameters are equal to zero is rejected. In addition, the pseudo R^2 shows that the specifications are acceptable for the two products. Moreover, the Hausman test of independence of irrelevant alternatives (Hausman & McFadden, 1984) leads us to fail to reject the hypothesis of no systematic difference in coefficients for all specifications, which implies the adequacy of the conditional logit model for this analysis.

The estimation of utility parameter coefficients reveals that respondents assigned a higher utility for organic food in relation to the conventional counterpart. In addition, respondents in all study countries, on average, overwhelmingly preferred conventional food over GM food, as shown in Tables 4 and 5. This finding is completely consistent with the literature reviewed. However, Spanish respondents were a slight exception to this finding. GM food (both cornflakes and tomato) with associated health benefits also had a positive impact on Spanish respondents' utility in relation to conventional food. Regarding the attribute 'price', increments on this variable were associated with a decrease in the utility level given by the choice. This is particularly important for the

case of GB and Spain, where this result is also consistent with other findings from the survey's open questions, in which respondents revealed that price was what they really considered when they purchased food. Moreover, local production also has an important positive effect on consumers' utility in the tomato case as shown in Table 5. This means that consumers prefer to consume locally produced tomatoes than imported ones. Finally, the analysis of the attribute 'product functionality' reveals that a reduction in carbohydrate levels for cornflakes is considered as positive for consumers' utility, except for the Spanish case where it is not, see Table 4.

Table 4: Discrete Choice conditional multinomial logit results for cornflakes

Attributes	ES	GB	DE
	Coef (st.dv.)	Coef (st.dv.)	Coef (st.dv.)
Organic	.448*** (.040)	.322*** (.038)	.862*** (.044)
GM Health Benefits	.127*** (0.042)	-.109*** (.042)	-.243*** (.050)
GM Environmental Benefits	-.710*** (0.052)	-.481*** (.045)	-.519*** (.053)
Price	-.430*** (0.026)	-.864*** (.035)	-.0435*** (.002)
Low carbohydrates	.0155 (0.024)	.064*** (.023)	.077*** (.027)
N. individuals	314	352	302
LL Value	-2057.6376	-2291.7437	-1697.3937
LR	520.87 ***	839.26 ***	909.58 ***
Pseudo R ²	0.112	0.1548	0.2113

*** Significant at the 1% level

Table 5: Discrete Choice conditional multinomial logit results for tomatoes

Attributes	ES	GB	DE
	Coef (st.dv.)	Coef (st.dv.)	Coef (st.dv.)
Organic	0.484*** (0.042)	0.460*** (0.041)	0.965*** (0.049)
GM Health Benefits	0.074*** (0.044)	-1.737*** (0.44)	-0.381*** (0.054)
GM Environmental Benefits	-0.568 (0.051)	-0.581*** (0.488)	-0.64*** (0.060)
Price	-0.539*** (0.028)	-1.008*** (0.038)	-0.049*** (0.002)
Locally produced	0.369*** (0.025)	0.354*** (0.024)	0.583*** (0.031)
N. individuals	314	352	302
LL Value	-1939.2366	-2103.8714	-1537.4001
LR	768.66***	1254.56***	1372.38***
Pseudo R ²	0.1654	0.2297	0.3086

*** Significant at the 1% level

From the estimated parameters, the willingness to pay results for both products are shown in Table 6. Aside from Spain, respondents required ‘compensation’ in order for them to choose GM food products. Furthermore, the level of ‘compensation’ has to be higher when GM technology is associated with environmental benefits than when it is associated with health benefits. Spanish respondents made a slight exception to this finding for they were prepared to pay a premium for GM food (for both cornflakes and tomatoes) with associated health benefits of about 10% higher than the average market price for conventional food.

In addition, our findings suggest different levels of preference amongst consumers in the study countries concerning organic food (see Table 6). As all study country respondents were prepared to pay a premium for organic food in relation to the conventional counterpart. Nevertheless, these organic ‘friendly’ countries can be divided into two groups. On the one hand there is GB and Spain, in which consumers were willing to pay about 25 to 45% over the respective average market price for cornflakes. On the other, in Denmark, the premium consumers were willing to pay is higher being about 50% above the respective average market price for the conventional equivalent.

Attitudes towards a ‘functional food’ attribute (low carbohydrate cornflakes) and ‘origin’ (locally produced tomatoes) were also examined (see Tables 6). These results differ between two study country groups for low carbohydrate cornflakes. First, we have Spain, where this attribute was found not to be significant in influencing consumers’ purchasing decisions. Second, in GB and Denmark this attribute was associated with an increase in consumers’ utility where, on average, it was found that consumers were willing to pay about 5% more for low carbohydrate cornflakes compared with regular cornflakes. Interestingly, and in contrast to this functional food attribute, locally produced food was positively valued in all the study countries with an associated premium of 30%.

Table 6: Estimated willingness to pay to change from conventional to other attribute level for a 500g box of cornflakes (€or DK or £/500g of cornflakes) or tomatoes (€or DK or £/1kg of tomatoes).

		Attributes			
Cornflakes		Organic	GM health benefits	GM environmental benefits	Low carbohydrates
Spain	WTP (Confidence intervals)	1.042 (0.83;1.25)	.294 (0.10;0.49)	-1.650 (-1.94;-1.35)	--
	% change from country average market price	+45%	+13%	-71%	--
GB	WTP (Confidence intervals)	.372 (0.28;0.46)	-.126 (-0.22;-0.03)	-.556 (-0.66;-0.45)	.0750 (0.02;0.12)
	% change from country average market price	+23%	-8%	-34%	+5%
Denmark	WTP (Confidence intervals)	19.79 (19.4;22.1)	-5.59 (-7.87;-3.30)	-11.93 (-14.4;-9.4)	1.76 (0.55;2.98)
	% change from country average market price	+56%	-16%	-34%	+5%
		Attributes			
Tomatoes		Organic	GM health benefits	GM environmental benefits	Locally produced
Spain	WTP (Confidence intervals)	.898 (0.73;1.06)	.136 (-0.12;0.29)	-1.05 (-1.25;-0.48)	.684 (.57; 0.79)
	% change from country average market price	+39%	+6%	-46%	+30%
GB	WTP (Confidence intervals)	.456 (0.37;0.53)	-.172 (-0.25;-0.08)	-.576 (-0.67;-0.47)	.351 (0.30;0.40)
	% change from country average market price	+28%	-10%	-35%	+21%
Denmark	WTP (Confidence intervals)	19.52 (17.47;21.5)	-7.77 (-9.9;-5.5)	-12.87 (-15.3;-10.4)	11.78 (10.4;13.1)
	% change from country average market price	+53%	-21%	+35%	+32%

The impact, if any, that socio-demographic characteristics (SDC) had on willingness to pay was also carefully examined (see Annex 3). Some SDC, such as income, age, gender and education seem to partially explain some differences in willingness to pay

between GM and organic food (see Annex 3 Tables 1 and 2). For example, younger respondents valued GM food more positively than older respondents and were willing to accept lower compensation to consume these products. In addition, older people were prepared to pay less for organic food than younger people were, except in Denmark where willingness to pay for organic food purchase increases with age (see Annex 3 Table 5).

As regards education, respondents with a university degree were willing to pay a higher premium for organic food than respondents with lower educational levels in GB and Spain but not in Denmark. They also required a higher level of compensation to consume GM food (Annex 3, Table 1). It was also seen that respondents from higher income groups required higher levels of compensation for them to buy GM food than those from lower income groups. Moreover, higher income group respondents were willing to pay a higher premium for organic food than were those from lower income groups (Annex 3, Table 2). There were also some gender differences in willingness to pay levels, in Denmark males needed a higher level of compensation for them to consume GM food than did females and they were also willing to pay more for organic food. In contrast, females were willing to pay a little more for organic food in Spain than in Denmark but no differences were observed in GB (Annex 3, Table 3).

SDC were relevant, for some study countries, in explaining differences in attitudes towards locally produced food. For example, consumers from higher income groups were willing to pay more for locally produced food than other consumers as were those respondents with higher education. Finally, considering the variable subjective knowledge about GM technology revealed important differences between study countries (Annex 3, Table 4). In Denmark, the respondents that felt they were most knowledgeable on GM technology needed major compensation to consume GM food with associated health benefits, compared with those less knowledgeable. In contrast, in GB, people with major subjective knowledge on GM technology were willing to pay less for the organic food and needed less compensation to consume GM food with associated health benefits. Finally, for the Spanish case, respondents with a higher level of subjective knowledge are willing to pay more for organic food and locally produced food compared with respondents with less subjective knowledge on the issue.

6. Discussion and Conclusions

This paper has detailed a cross-country comparison across Denmark, Spain and GB in order to identify European consumers' purchasing intentions towards, and willingness to pay for, GM and organic food. The study products were cornflakes to represent a processed food, and tomatoes to represent a 'fresh' food. Our survey results indicate that respondents in each study country, on average, overwhelmingly preferred conventional food over GM food. This finding is completely consistent with Onyango et al. (2004), Christoph et al. (2006), Burton & Pearce (2002) and Rigby & Burton (2006) amongst others writing about consumers' attitudes to GM food. However, Spanish respondents were a slight exception to this finding for they seemed to be prepared to pay a premium for GM food (both cornflakes and tomatoes) with associated health benefits. This result is also consistent with the findings of Burton & Pearce (2002), at least for some segments of Australian consumers. This shows the relevance and importance of an adequate labelling policy for GM food.

Moreover, it can also be concluded that the stated consumption patterns and wtp regarding GM and organic products did not vary much between processed and fresh food. That is, consumers revealed similar attitudes associated with the 'production technology' attribute, for both cornflakes and tomatoes.

Aside from Spain, respondents in Denmark and GB required 'compensation' in order for them to choose GM food products for their and their families' consumption. Furthermore, the level of 'compensation' has to be higher when GM technology is associated with environmental benefits (so-called first generation GM crops) than when it is associated with health benefits (GM with associated consumer benefits). In these cases, it can be taken that consumers are, in effect, not prepared to consume GM products at all and that consumers with environmental values do not reveal a positive attitude towards GM environmentally friendly food.

Attitudes towards the attributes 'functional food' (low carbohydrate cornflakes) and 'origin' (locally produced tomatoes) were also examined. These results allow us to differentiate between two study country groups regarding low carbohydrate cornflakes.

On the one hand, we have Spain where this attribute was found not to be significant in consumers' purchasing decisions. On the other hand, in GB and Denmark, this attribute was associated with an increase in consumers' utility. Interestingly, and in contrast, locally produced food was positively valued in each study country.

It was found that non-SDC were especially relevant in explaining differences in consumers' utilities associated with low carbohydrate cornflakes whereas age, income, and education were relevant, for some study countries, in explaining differences in attitudes towards locally produced food. In fact, consumers from higher income groups were willing to pay more for locally produced food as were those respondents with higher education for locally produced food. Finally, the level of subjective knowledge has been detected to be relevant on defining consumers' willingness to pay for organic, GM food and locally produced food with important cross country differences (see Annex 3 Table 4).

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Annex 1

Background information given to respondents about GM food

Health benefits

Oxygen is involved in certain chemical reactions in cells, a process known as oxidation. This process produces unstable molecules called 'free radicals'. Free radicals set off damaging chain reactions in cell tissues such as DNA and cell membranes, which can lead to cancers, heart disease and other illnesses.

A group of naturally occurring chemicals counteracts the effects of free radicals by slowing down their formation. These chemicals are called 'Anti-oxidants', and include: Vitamins A, C and E; pigments such as beta-carotene; and a mineral called selenium.

Although certain foods, particularly fresh fruit and vegetables, are rich in some of these anti-oxidants, many people do not get enough of them. GM technologies can enhance levels of beneficial anti-oxidants in common foods such as maize, rapeseed oil and tomatoes, leading to potential health benefits for those eating them.

Environmental benefits

All farmers have to control weeds, as these compete with their crops for light, water and nutrients. Traditionally, farmers control weeds by spraying herbicide onto the soil before the crop emerges, because the herbicide is also damaging to the crop.

GM technologies can make crops resistant to the damaging effects of certain herbicides, so farmers can apply them after the crop emerges from the soil. This means that farmers only need apply the herbicide if weeds become a problem. This provides a number of environmental benefits:

1. Less herbicide is applied.
2. Less soil cultivation is required, leading to better soil structure.
3. Weeds can be left to provide food and habitat for wildlife at times when they are not damaging to the crop.
4. Less herbicide spraying and less soil cultivation means less tractor fuel is used.

Annex 2

An example of the choice set used in GB

Choice set	Option A	Option B	Option C	Option D
	£0.70	£1.00	£2.40	Non option
	Organic	GM – health benefit	Conventional	
	Local	Imported	Imported	

Annex 3

Table 1. Estimated willingness to pay to change from the conventional to another attribute level for a 500g box of cornflakes or a kg of tomatoes considering respondents' level of education.

Level of education Willingness to pay (Confidence intervals)		Attributes					
		Organic	GM health benefits	GM environmental benefits	Low carbohydrates		
Spain	Cornflakes	S1	0.72 (0.38;1.06)	0.51 (0.18;0.85)	-1.43 (-1.90;-0.97)	--	
		S2	0.88 (0.61;1.15)	0.14 (-0.12;0.40)	-1.50 (-1.88;-1.13)	--	
		S3	2.04 (1.08;2.99)	0.74 (0.05;1.42)	-2.67 (-3.95;-1.38)	--	
	Tomatoes	S1	0.65 (0.41;0.89)	0.29 (0.05;0.54)	-0.86 (-1.15;-0.57)	0.65 (0.49;0.81)	
		S2	0.70 (0.46;0.94)	.03 (-0.20;0.27)	-0.88 (-1.17;-0.58)	0.55 (0.39;0.71)	
		S3	2.06 (1.28;2.84)	0.40 (-0.15;0.94)	-2.20 (-3.16;-1.25)	1.26 (0.76;1.75)	
	GB	Cornflakes	S1	0.18 (0.05;0.31)	-.03 (-0.17;0.10)	-0.44 (-0.59;-0.29)	.05 (0.03;0.13)
			S2	0.40 (0.24;0.57)	-.21 (-0.38;-0.03)	-.64 (-0.84;-0.44)	.12 (0.02;0.22)
			S3	0.64 (0.45;0.84)	-.17 (-0.37;0.03)	-.65 (-0.88;-0.42)	.06 (-0.05;0.17)
Tomatoes		S1	.23 (0.12;0.35)	-0.09 (-0.21;0.03)	-.37 (-0.50;-0.24)	.21 (0.15;0.28)	
		S2	0.51 (0.37;0.65)	-.20 (-0.35;-0.05)	-.65 (-0.83;-0.47)	0.46 (0.36;0.55)	
		S3	0.81 (0.60;1.02)	-0.27 (-0.48;-0.06)	-.93 (-1.21;-0.66)	0.48 (0.35;0.61)	
Denmark	Cornflakes	S1	22.45 (15.02; 29.88)	-3.54 (-9.98;2.9)	-13.02 (-20.46;-5.58)	2.20 (-1.44;5.87)	
		S2	18.98 (15.65;22.31)	-3.83 (-7.10;-0.56)	-13.18 (-16.91;-9.4)	0.91 (-0.84;2.66)	
		S3	19.65 (16.24; 23.06)	-8.75 (-12.4;-5.12)	-9.85 (-13.52; -6.19)	2.59 (0.75;4.43)	
	Tomatoes	S1	24.7 (17.5;32)	-8.9 (-15.6;-2.2)	-17.2 (-25.2;-9.2)	17 (11.9;22.1)	
		S2	16.3 (13.7;18.9)	-5.9 (-8.8;-3.1)	-11.9 (-15.2; -8.6)	10.5 (8.8;12.3)	
		S3	21.6 (18.2;25.1)	-9.8 (-13.5;-6.1)	-12.4 (-16.5;-8.4)	11.2 (9;13.4)	

S1: Schooling to 16 yrs; S2: Further education or training (A levels, HNC, HND, NVQ levels 1-3 etc); S3: Higher education (Degree, Masters, PhD etc).

Table 2. Estimated willingness to pay to change from the conventional to another attribute level for a 500g box of cornflakes or a kg of tomatoes considering respondents' income level.

		Attributes			
		Organic	GM health benefits	GM environmental benefits	Low carbohydrates
Spain	Cornflakes	I1 0.772 (0.53;1.01)	0.095 (-0.14;0.33)	-1.28 (-1.60;-0.96)	--
		I2 1.13 (0.76;1.50)	0.14 (-0.12;0.40)	-1.50 (-1.88;-1.13)	--
		I3 2.95 (0.60;5.30)	0.70 (-0.53;1.94)	-3.85 (-7.92;-0.78)	--
	Tomatoes	I1 0.73 (0.54;0.91)	-0.05 (-0.24;0.14)	-0.79 (-1.01;-0.56)	0.51 (0.39;0.63)
		I2 0.91 (0.61;1.21)	.36 (0.07;0.65)	-1.19 (-1.58;-0.8)	0.82 (0.61;1.03)
		I3 2.3 (0.8;3.8)	0.64 (-0.29;1.57)	-2.69 (-4.52;-0.86)	1.55 (0.56;2.55)
	Cornflakes	I1 0.24 (0.12;0.36)	-.05 (-0.17;0.07)	-0.5 (-0.65;-0.4)	.034 (0.03;0.16)
		I2 0.24 (0.04;0.44)	0.04 (-0.16;0.24)	-.45 (-0.68;-0.22)	.14 (0.02;0.25)
		I3 0.70 (0.50;0.89)	-.40 (-0.61;-0.19)	-.71 (-0.94;-0.48)	.11 (-0.01;0.22)
GB	Tomatoes	I1 .31 (0.20;0.41)	-0.10 (-0.21;0.01)	-.46 (-0.58;-0.33)	.26 (0.19;0.32)
		I2 0.42 (0.22;0.62)	-.16 (-0.37;0.05)	-.49 (-0.73;-0.25)	0.42 (0.28;0.55)
		I3 0.77 (0.59;0.94)	-0.31 (-0.49;-0.14)	-.88 (-1.11;-0.65)	0.49 (0.38;0.61)
	Cornflakes	I1 19.3 (16.38; 22,26)	-6.58 (-9.68;-3.48)	-10.33 (-13.53;-7.13)	0.78 (-0.83;2.39)
		I2 21.78 (14.61;28.95)	-3.11 (-9.61;3.39)	-16.98 (-25.33;-8.62)	4.35 (0.71;7.99)
		I3 20.17 (15.97; 24.37)	-5.37 (-9.29;-1.44)	-12.37 (-16.75; -7.99)	2.13 (0.0;4.25)
Denmark	Tomatoes	I1 19.3 (16.6;22)	-8.5 (-11.6;-5.5)	-10.9 (-14.1;-7.6)	9.3 (7.5;11)
		I2 22.14 (15.5;28.7)	-2.33 (-8.57;-3.91)	-21.39 (-30.12; -12.6)	13.7 (9.3;18.09)
		I3 19.5 (16;23)	-9.04 (-12.7;-5.4)	-12.5 (-16.6;-8.4)	14.25 (11.7;16.7)
	Cornflakes	I1 19.3 (16.6;22)	-8.5 (-11.6;-5.5)	-10.9 (-14.1;-7.6)	9.3 (7.5;11)

Spain I1: <7 to 22; **I2:** 22-37;**I3:** 37to >52 *1000 €; **GB I1:**4.8-24;**I2:** 24-33.6;**I3:**33.6 to >48*1000 £;
Denmark I1 < 175 to 300; **I2:** 300 -400; **I3:** 400 to >600 *1000 Dk.

Table 3. Estimated willingness to pay to change from the conventional to another attribute level for a 500g box of cornflakes or a kg of tomatoes considering respondents' gender.

Gender Willingness to pay (Confidence intervals)			Attributes			
			Organic	GM health benefits	GM environmental benefits	Low carbohydrates
Spain	Cornflakes	Male	0.72 (0.37;1.06)	0.30 (-0.04;0.64)	-1.05 (-1.48;-0.62)	--
		Female	1.15 (0.88;1.41)	0.30 (-0.04;0.64)	-1.05 (-1.48;-0.62)	--
	Tomatoes	Male	0.65 (0.37;0.94)	-0.03 (-0.32;0.26)	-0.69 (-1.03;-0.35)	0.40 (0.22;0.57)
		Female	0.96 (0.76;1.15)	.20 (0.01;0.39)	-1.17 (-1.43;-0.92)	0.77 (0.64;0.91)
GB	Cornflakes	Male	0.31 (0.14;0.48)	-.19 (-0.38;-0.01)	-0.48 (-0.68;-0.28)	.09 (-0.01;0.19)
		Female	0.40 (0.29;0.50)	-0.10 (-0.21;0.01)	-.58 (-0.71;-0.46)	.07 (0.01;0.13)
	Tomatoes	Male	.40 (0.23;0.56)	-0.14 (-0.31;0.03)	-.74 (-0.96;-0.52)	.38 (0.27;0.48)
		Female	0.48 (0.39;0.57)	-.18 (-0.28;-0.08)	-.52 (-0.63;-0.41)	0.34 (0.28;0.40)
Denmark	Cornflakes	Male	26.83 (21.9; 31.7)	-10.03 (-14.4;-5.6)	-12.5 (-16.72;-7.58)	0.42 (-1.85;2.69)
		Female	16.32 (13.7;18.9)	-3.55 (-6.18;-0.91)	-11.62 (-14.57;-8.67)	2.20 (0.78;3.62)
	Tomatoes	Male	25.36 (21.1;29.6)	-10.14 (-14.34;-5.9)	-14.8 (-19.5;-10.4)	10.8 (8.31;13.28)
		Female	16.74 (14.4;19)	-6.78 (-9.32;-4.24)	-11.78 (-14.67; -8.8)	12.5 (10.53;13.7)

Table 4. Estimated willingness to pay to change from the conventional to another attribute level for a 500g box of cornflakes or a kg of tomatoes considering respondents' knowledge about GM technology.

Knowledge Willingness to pay (Confidence intervals)			Attributes			
			Organic	GM health benefits	GM environmental benefits	Low carbohydrates
Spain	Cornflakes	Not well informed	0.82 (0.63;1.02)	0.18 (0.00;0.37)	-1.56 (-1.84;-1.28)	--
		Well informed	3.50 (1.25;5.75)	1.53 (0.21;2.85)	-1.82 (-3.39;-0.25)	--
	Tomatoes	Not well informed	0.68 (0.53;0.83)	0.03 (-0.13;0.18)	-0.90 (-1.10;-0.71)	0.61 (0.51;0.71)
		Well informed	3.50 (1.49;5.51)	1.32 (0.21;2.43)	-2.20 (-3.75;-0.65)	1.18 (0.37;1.99)
	Cornflakes	Not well informed	0.25 (0.15;0.34)	-0.08 (-0.18;0.02)	-0.44 (-0.55;-0.33)	.06 (0.01;0.12)
		Well informed	0.90 (0.61;1.19)	-0.32 (-0.60;-0.05)	-1.10 (-1.47;-0.73)	0.14 (-0.01;0.28)
GB	Tomatoes	Not well informed	.33 (0.25;0.42)	-0.12 (-0.21;-0.03)	-.43 (-0.53;-0.32)	.34 (0.28;0.39)
		Well informed	0.89 (0.68;1.10)	-0.33 (-0.54;-0.11)	-1.15 (-1.45;-0.85)	0.42 (0.29;0.55)
Denmark	Cornflakes	Not well informed	18.4 (15.6; 21.2)	-3.5 (-6.2;-0.7)	-11.4 (-14.4;-8.4)	1.9 (0.5;3.4)
		Well informed	22.59 (18.4;26.7)	-10.56 (-14.8;-6.32)	-12.66 (-17.02;-8.29)	1.35 (-0.73;3.44)
	Tomatoes	Not well informed	17.9 (15.5;20.3)	-5.3 (-7.8;-2.7)	-13.5 (-16.5;-10.5)	12.5 (10.8;14.2)
		Well informed	23.1 (19.1;27)	-13.83 (-18.2;-9.5)	-11.35 (-15.64; -7.05)	10.11 (7.72;12.5)
	Cornflakes	Not well informed	18.4 (15.6; 21.2)	-3.5 (-6.2;-0.7)	-11.4 (-14.4;-8.4)	1.9 (0.5;3.4)
		Well informed	22.59 (18.4;26.7)	-10.56 (-14.8;-6.32)	-12.66 (-17.02;-8.29)	1.35 (-0.73;3.44)

Table 5. Estimated willingness to pay to change from the conventional to another attribute level for a 500g box of cornflakes or a kg of tomatoes considering respondents' age.

Age Willingness to pay (Confidence intervals)		Attributes					
		Organic	GM health benefits	GM environmental benefits	Low carbohydrates		
Spain	Cornflakes	A1	0.89 (0.57;1.22)	0.47 (0.16;0.78)	-1.52 (-1.98;-1.06)	--	
		A2	1.14 (0.67;1.61)	0.22 (-0.19;0.63)	-1.52 (-2.12;-0.92)	--	
		A3	2.05 (0.98;3.12)	0.61 (-0.11;1.32)	-3.10 (-4.62;-1.57)	--	
		A4	0.71 (0.41;1.01)	0.00 (-0.3;0.30)	-1.19 (-1.58;-0.8)	--	
	Tomatoes	A1	0.87 (0.57;1.16)	0.23 (-0.06;0.53)	-0.97 (-1.34;-0.6)	0.34 (0.16;0.51)	
		A2	0.99 (0.66;1.32)	-0.11 (-0.42;0.20)	-0.85 (-1.23;-0.46)	0.87 (0.64;1.11)	
		A3	0.95 (0.61;1.30)	-0.03 (-0.35;0.50)	-0.91 (-1.31;-0.51)	0.86 (0.62;1.11)	
		A4	0.82 (0.44;1.20)	0.46 (0.08;0.84)	-1.57 (-2.12;-1.02)	0.72 (0.45;0.98)	
GB	Cornflakes	A1	0.24 (0.05;0.43)	0.12 (-0.08;0.32)	-0.32 (-0.54;-0.10)	.08 (-0.03;0.2)	
		A2	0.54 (0.37;0.72)	-0.22 (-0.41;0.03)	-.74 (-0.96;-0.51)	.11 (0.0;0.21)	
		A3	0.51 (0.35;0.67)	-0.26 (-0.43;0.10)	-.63 (-0.82;-0.45)	.06 (-0.03;0.15)	
		A4	-0.08 (-0.28;0.12)	0.04 (-0.16;0.24)	-.34 (-0.56;-0.12)	.02 (-0.09;0.14)	
	Tomatoes	A1	.48 (0.28;0.68)	-0.01 (-0.22;0.19)	-.56 (-0.80;-0.32)	.40 (0.27;0.53)	
		A2	0.58 (0.43;0.73)	-.30 (-0.46;0.14)	-.62 (-0.80;-0.43)	0.42 (0.32;0.52)	
		A3	0.54 (0.40;0.68)	-0.29 (-0.44;-0.13)	-.63 (-0.81;-0.46)	0.37 (0.28;0.46)	
		A4	0.00 (-0.17;0.17)	0.14 (-0.03;0.31)	-.38 (-0.57;-0.19)	0.11 (0.02;0.21)	
	Denmark	Cornflakes	A1	11.22 (8.49; 13.96)	-2.63 (-5.80;0.55)	-5.16 (-8.24;-2.08)	0.99 (-0.69;2.67)
			A2	17.64 (14.21;21.06)	-5.00 (-8.57;1.43)	-9.60 (-13.34;-5.87)	1.29 (-0.60;3.18)
			A3	25.84 (18.48; 33.20)	-8.27 (-14.6;-1.94)	-20.29 (-28.37; -12.2)	3.44 (0.10;6.78)
			A4	51.47 (28.46; 74.47)	-11.7 (-23.5;0.17)	-35.47 (-54.7; -16.2)	3.88 (-2.2;9.96)
Tomatoes		A1	12.04 (9.37;14.7)	-4.02 (-7.08;-0.97)	-6.97 (-10.28;-3.6)	9 (7.25;10.7)	
		A2	17.85 (15;20.7)	-5.64 (-8.87;-2.4)	-10.08 (-13.61;-6.55)	9.17 (7.3;11)	
		A3	25.4 (19.2;31.5)	-13.1 (-19.2;-7.1)	-17.8 (-24.6;-10.9)	15.4 (11.2;19.5)	
		A4	40.28 (24.7;55.7)	-16.53 (-27.7;-5.3)	-33.8 (-50;-17.8)	25.6 (15.4;35.7)	

A1: 18-25; A2: 26-40; A3: 41-65; A4: >65