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Consumers' Willingness to Pay for Functional Agricultural Foods

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Implications of a Nutrition Driven Food Policy for Land Use and the Rural Environment

Abstract

This report examines consumers' willingness-to-pay for enhanced foods by surveying a representative sample of 200 people across the UK. Acceptance by the general public of these non-genetically modified products is addressed using choice-based experiments.

Our research focuses on three fresh products, strawberries and lettuce with higher antioxidant levels, and lamb chops with higher levels of unsaturated fatty acids. Strawberries and lettuce grown under plastic tunnels are UV-light deprived, which could cause lower than average antioxidant levels, a problem addressed by using UV-permeable plastic. Fatty acids profile in meat can be improved by rearing lambs in open pastures on a variety of natural grasses and herbs.

Our experiments measure the willingness to pay for different products attributes, and are designed to disentangle consumers' preferences for production method and functional aspects. For example, we estimate the price consumers are willing to pay for strawberries that are produced in the open, independently from functional characteristics that are the result of outdoor production, such as longer shelf life and higher antioxidant levels. We also measure consumers' preferences for alternative delivery of the antioxidants through dietary supplements. Further, we investigate the impact of individual characteristics of consumers such as their socio-demographics on their demand for these foods.

Results from a nation-wide survey carried out in late 2006 show that there is a positive willingness to pay for production methods that would enhance the health profile of all three products, while we observe a strong rejection of pill alternatives. The enhanced products appear to be preferred by younger, urban people, while pill substitutes are mostly rejected by women, people with a higher job position, and households with children under 18.

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1 Introduction

There is no definitive definition of functional foods, and different studies have different understandings of the concept (Cockbill, 1994). While some consider them to lie between food and drugs (Chadwick, 2000), others stress the modifications brought to a product in order to decrease the occurrence of certain diseases, or increase some beneficial physiological effects (Bech-Larsen and Grunert, 2003). These definitions tend however to ignore naturally occurring functional foods.
In the present study, we consider a broad definition, and we deem to be functional a food which has added nutritional benefits, benefits which can either be naturally occurring (*e.g.*, broccoli), or are added at the point of production (*e.g.*, juice with added calcium).

Innovative, yet natural, production methods allow scientists to increase the antioxidant content of some fruit and vegetables, and to produce meat with a healthier fat profile. In the context of an increasing market for these products (Schmidt, 2000), we examine the consumers' attitude to such foods, using the example of products currently developed at the University of Reading, namely fresh strawberries, lettuce, and lamb.
Strawberries and lettuce are traditionally grown under plastic tunnels, that is without direct exposure to sunlight. This lack of exposure to ultra-violet rays can result in lower levels of antioxidants such as anthocyanin. As it is not possible to grow these products in the open due to weather constraints, a plastic specifically permeable to UV light has been developed and put to trial to grow strawberries and lettuce that would have higher antioxidants levels than those available on the market, (Battey *et al.*, 2006).
Saturated fatty acids are detrimental to health, while unsaturated fatty acids such as *omega-3* are beneficial. By rearing lamb in open pastures on a variety of natural grasses and herbs, it is possible to improve this balance in meat (Kliem *et al.*, 2006).

2 Literature Review

The decision to purchase functional foods depends on various factors, including healthiness, taste, pleasure, convenience, price and confidence in the functional health claim (Urala, 2005). Bech-Larsen and Grunert (2003) stress moreover that these products are not considered an homogeneous food category, and therefore that the base product type is also relevant to the purchase decision, as the consumer's perception is based mostly on the nutrient content of the product (*e.g.*, low fat), rather than on any health claim associated to it, *e.g.*, lower risk of heart disease (Caswell *et al.*, 2003). A few studies (*e.g.*, van Kleef *et al.*, 2005) found however that health claims could be the main motivation to buy functional foods, even though physiological benefits *i.e.* improved physical or cognitive performances, could be more motivating, and preferred over psychological claims like improved emotional well-being (Tuorila and Cardello, 2002).

Some studies indicate that price can be a deterrent to the consumption of functional foods (Asselin, 2005), although it has been found that consumers were actually willing to pay a premium for these foods (West *et al.*, 2002; Larue *et al.*, 2004). These studies showed however a differential behaviour with respect to the kind of food considered: consumers are more willing to pay for 'anti-cancer' tomatoes than for 'heart-healthy' chicken breasts, which is consistent with other findings showing that modification of a plant product is more acceptable than that of an animal product (Larue *et al.*, 2004; Optima, 1994).

Acceptance of novel foods can also be influenced by socio-demographic characteristics of the consumer. It appears that women have a more positive perception of such products, along with more natural and organic products (Verbeke, 2005), and are less favourable to biotechnology and industrialised, processed foods (Lockie *et al.*, 2005). They also tend to be more aware of potential diet-related diseases (IFIC, 2002). While women tend to be more receptive to claims concerning a healthier digestive system (in the case of probiotic drinks), men prefer products increasing bone strength, through added vitamins or minerals for instance (Urala *et al.*, 2003).
Marital status can also have an impact on the propensity to buy functional foods, with married couples more likely to buy than single people (Katan and DeRoos, 2004).

Age is also a determinant, and Pelletier *et al.* (2002) found that younger people, especially men, were more sceptical of health claims. Conversely, Childs and Poryzees (1997), and Poulsen (1999) found that middle aged and older people have more trust in functional foods, and believe them to be beneficial to health and that they should be part of a daily diet.
Awareness of potential diseases, be it through a relative (Verbeke, 2005) or through education (IFIC, 2002; Gray, 2002) also increases the probability to buy functional foods. Conversely, lack of information on potential diet-derived health benefits has been found to be a reason why people do not fully trust functional foods (NIN, 2000). Another factor is the perceived lack of transparency of information (Bech-Larsen *et al.*, 2001).

As far as raising the consumer's trust is concerned, a labelling change does not appear to modify consumers' preferences or how much they remember from the label (Balasubramanian and Cole, 2002); keeping the information short and simple appears to be a better way to communicate the expected benefits (Harrison and McLennon, 2003), keeping in mind that this information should be product-specific (van Kleef *et al.*, 2005).

Finally, any health benefit is of little importance with regards to any organoleptic loss: consumers are unwilling to buy functional products whose taste would be worse than that of the conventional version (Tuorila and Cardello, 2002).

3 Survey Questionnaire

Explanatory research on consumers' acceptance of enhanced strawberries and lamb was conducted at the University of Reading in July 2oo6, in the form of two focus groups. Results show that participants were more enthusiastic about lamb than strawberries, which were deemed as already healthy. Although 'guilt-free' lamb was welcome, scepticism prevailed towards novel foods in general, which were perceived as expensive and a marketing ploy.
From these qualitative findings, we designed a choice-experiment questionnaire focusing on three products: fresh whole lettuce, 500-gram pack of fresh strawberries, and 500-gram pack of fresh lamb chops. Early designs of the survey were piloted among staff and students, so as to adjust the attributes

to be included, as well as their levels.
Designs for plant products were similar, with two 4-level attributes (*price* and *method of production*), and another 2-level attribute: extended shelf-life for strawberries, colour of the leaves (redder or greener[1]) for the lettuce. The levels of the *method of production* attribute reflected different scenarios: *standard*, that is what is currently available on the market; *standard+pill*, where the pill is an antioxidant supplement sold with the product; *enhanced*, that is strawberries or lettuce grown under UV-permeable plastic tunnel; or *grown in the open*.
For lamb, a 4-level price attribute and three attributes in the form of dummy variables were included: *enhanced*, that is lamb reared on open pastures on a variety of natural grasses and herbs; *GM*, that is lamb genetically modified, although this was not linked to the enhancement in the design; or *free range*, ensuring that the welfare rights of the lamb have been upheld.
Respondents were also given background information on the enhanced version of the products proposed in the questionnaire, stressing that they were not genetically modified in any way, and that the means of production were natural. In the case of strawberries, extended shelf-life as a consequence of higher antioxidants levels was mentioned, as well as the redder tinge in the case of the lettuce.
Designs are summarised in table 1 for strawberries and lettuce, and in table 2 for lamb.

Tab. 1: Attributes and levels chosen for Strawberries and Lettuce choice experiments.

Levels	**Price**		**Type 1**	**Type 2**	
	Strawberries	*Lettuce*	**Production**	*Strawberries*	*Lettuce*
L_1	£2.49	£0.40	standard	longer shelf-life	greener
L_2	£2.99	£0.60	standard+pill	*nothing stated*	redder
L_3	£3.49	£0.80	enhanced	—	—
L_4	£3.99	£1.00	grown in the open	—	—

[1] Show cards picturing actual redder or greener varieties of lettuce were presented to the respondents.

Tab. 2: Attributes and levels chosen for Lamb choice experiments.

Levels	**Price**	**Type 1**	**Type 2**	**Type 3**
L_1	£3.99	enhanced	GM	free range
L_2	£4.49	*nothing stated*	*nothing stated*	*nothing stated*
L_3	£4.99	—	—	—
L_4	£5.49	—	—	—

Considering the number of attributes and levels, a full factorial design would have resulted in too many questions for each respondent: we therefore opted for a fractional design. A set of 16 cards was created for each of the three products,[2] and, as this was still too high, respondents were presented with only 7 questions for each product. We opted for 3-option choices, with no status quo nor *no consumption option*. For each product, three independent sets of cards were generated using SPSS, so as to ensure orthogonality of the design, and questionnaires were then created by randomly associating cards from each set together, to generate as many choice sets as required, following the technique suggested by Louviere, Hensher and Swait (2000). An example of a choice question for strawberries is given in table 3, while a complete example questionnaire is given in the appendix.

Tab. 3: Example of a choice set for strawberries: "Please look at the choices and tell me which 500-gram punnet of fresh strawberries you would prefer to buy".

Attributes	Choice A	Choice B	Choice C
Type 1	standard	standard+pill	enhanced
Type 2	—	longer shelf-life	—
Price	£2.99	£3.49	£3.99

[2] Although lamb and plant products have different attributes and numbers of degrees of freedom required for consistent estimation, fractional designs are of the same size.

4 Econometric Model

The choices made by consumers can be described by the random utility model (McFadden, 1973): the utility U_{ij} of option j, $j = 1, \ldots, J$ for respondent i, $i = 1, \ldots, N$ is:

$$U_{ij} = \mathbf{X}'_{ij}\beta + \varepsilon_{ij} \qquad , \tag{1}$$

and the consumer chooses option j when:

$$U_j > U_k \qquad \forall\ j \neq k \qquad , \tag{2}$$

where $\mathbf{X}_{ij}$ is the vector of attribute levels, β is the vector of coefficients to be estimated, and ε_{ij} is the disturbance term. It is further assumed that the error terms are independently and identically distributed following a Weibull distribution. Following results by McFadden (1973), the probability $P(Y = j)$ of option j to be chosen over the others is then:

$$P(Y = j) = \frac{\exp\left(\mathbf{X}'_{ij}\,\beta\right)}{\sum_{j=1}^{J} \exp\left(\mathbf{X}'_{ij}\,\beta\right)} \qquad . \tag{3}$$

This probability can be used as the basis of a likelihood function which can be used for estimation.

5 Data Set

The survey was conducted through face-to-face interviews across the UK in late 2006; a stratified sample of respondents was selected so as to ensure a balanced mix of socio-demographic backgrounds. Choice experiment questions were only one part of our survey and a more general section about each respondent's characteristics, age, gender, household composition, *etc.*, was also included.

The way the survey was administered ensured a maximum response rate, and all of the 200 questionnaires collected could be used in our analysis. The gender ratio is quite unbalanced, with 80% of respondents being female: this was expected inasmuch as the survey targeted the person in charge of food purchase in the household. The age mean is 40 years, with a median at 38, the youngest respondent being 18, the eldest 64. Concerning education, 52% were 16 years old or younger when they left full-time education,

while 16% were 20 or older. The social grade of respondents was obtained from their occupation, and our sample is evenly distributed across the four categories (A/B, C1, C2 and D/E). Annual income was recorded as brackets of £10,000: 42% of the sample is below £10,000 per year, and 82% below £30,000. Weekly spending on food was also documented, as brackets of £10: 36% of the sample spend under £50, while 24% spend over £80 per week.
The average household size is 2.7, with a median of 2, a minimum of 1 and a maximum of 7; just over 60% are either married or living with a partner, while 17% are either separated, divorced or widowed. While 48% of the respondents have no children, 45% have either one or two children under 18 living in their household. From the postcode information collected, we could determine that 58% of the sample were living in a predominantly urban area, while 42% had a predominantly rural dwelling.

6 Estimation & Results

Some questionnaires had to be discarded prior to analysis, due to missing values (5 respondents out of 200 were vegetarians and thus did not answer to the lamb questions), or due to a lexicographic bias: some respondents only responded to price, always choosing the cheapest of the three options presented. As noted by Burton and Pearse (2002), these people are likely to have a different utility function from the rest of the sample, and should therefore be removed before analysis. This left us with 180 questionnaires for strawberries, 185 for lettuce, and 184 for lamb.[3]
In the case of plant products, the method of production variable had to be coded by dummies, as it was non-linear; the level *standard* was chosen as the reference, and was dropped from the estimation. Other attributes with only two levels were also coded as dummies: 1 when the lettuce is redder, when the strawberries have a longer shelf-life, when the lamb is enhanced, GM, or free range.
Statistical analysis of the conditional logit was carried out using LIMDEP; normalised results for main effects only are presented in table 4 for all three products.

[3] Nine respondents were removed from all three product questionnaires, and another seven from two out three: this consistency in behaviour for different products supports our assumption that these people had indeed a different utility function.

Tab. 4: Normalised parameters estimates for main effects, for strawberries, lettuce and lamb. Log Likelihood = −1092.243 (strawberries); −1156.160 (lettuce); −1050.389 (lamb).

	Strawberries			**Lettuce**			**Lamb**		
	Coeff.	Std Error	p-value	Coeff.	Std Error	p-value	Coeff.	Std Error	p-value
Price	−1.000	0.063	0.000	−1.000	0.148	0.000	−1.000	0.066	0.000
Open	1.422	0.056	0.000	0.728	0.055	0.000	—	—	—
Pill	−2.232	0.094	0.000	−1.352	0.094	0.000	—	—	—
Enhanced	0.778	0.056	0.000	0.484	0.055	0.000	1.028	0.078	0.000
Shelf-life +	0.341	0.067	0.001	—	—	—	—	—	—
Red +	—	—	—	−0.477	0.065	0.000	—	—	—
GM	—	—	—	—	—	—	−3.518	0.077	0.000
Free Range	—	—	—	—	—	—	1.839	0.074	0.000

All our estimates are significant at the 1% level, and are consistent with our expectations. First concerning plant products, there is a positive willingness-to-pay for the *enhanced* versions, at $+78p$ and $+49p$ respectively for strawberries and lettuce;[4] there is however a much larger WTP for products *grown in the open*, which are not available on the market, respectively at $+142p$ and $+73p$. We also observe a strong rejection of the *pill supplement*, with negative WTP at $-232p$ and $-135p$ respectively for strawberries and lettuce. While there is an expected positive WTP for strawberries with an extended *shelf-life* ($+34p$), there is a surprising negative WTP for *redder* lettuce ($-48p$), although it had been explained to respondents that the colour was a direct cause of a higher antioxidant content.
Concerning lamb, there is a fairly high positive WTP for the *enhanced* version ($+103p$), and a higher WTP for the *free-range* ($+184p$). In absolute terms, there is however an even higher rejection of the *GM* lamb, with a WTP at $-352p$.

Further specifications were then estimated, including interaction terms between the main effects and the socio-demographic variables. Some of these variable such as age or size of the household were linear, and could therefore be used directly. Other variables have been coded as dummies: gender was coded as 1 for male, job was coded as 1 for categories A/B & C1, or 'white collar' jobs, dwelling as 1 for urban, marital status as 1 for couples (married or not), education as 1 for respondents who were over 18 when they left full-time education, and the presence of children under 18 coded as 1. Weekly spending and income have been normalised by the size of household, or by the number of adults in the household, respectively.
As several respondents could not or would not disclose their household annual income, the number of questionnaires available for analysis was further reduced, down to 120 for strawberries, 124 for lettuce, and 123 for lamb. For each product we report a model which had the best fit in terms of log-likelihood, and the highest number of significant interaction terms. These results are presented in tables 5, 6 and 7, respectively for strawberries, lettuce and lamb.
The introduction of interaction terms entails two noteworthy changes: first, as far as the log-likelihood is concerned, the interactions improve significantly

[4] All the WTP are given as pence per pack of 500 grams for lamb and strawberries, and as pence per whole lettuce.

the fit of the model for all three products. Second, concerning main effects, we observe a loss of significance in all three specifications, with some coefficients even changing sign: this may be due to a multicollinearity problem, as a result of the presence of the interactions.

Tab. 5: Normalised parameters estimates for main effects and interactions for strawberries. Log Likelihood = −692.769

		Strawberries		
		Coeff.	Std Error	p-value
Main effects	Price	−1.000	0.080	0.000
	Open	0.755	0.258	0.031
	Pill	−0.396	0.429	0.494
	Enhanced	0.369	0.112	0.015
	Shelf-life +	0.181	0.114	0.242
Interactions	Open*Job	0.573	0.146	0.004
	Open*Urban	−0.279	0.108	0.056
	Open*Couple	−0.352	0.144	0.070
	Open*Education	−0.851	0.148	0.000
	Open*Spending	0.760	0.171	0.001
	Pill*Gender	0.752	0.218	0.011
	Pill*Job	−1.085	0.249	0.001
	Pill*Couple	0.810	0.220	0.007
	Pill*Education	0.981	0.210	0.001
	Pill*Children	−0.590	0.184	0.018
	Pill*Spending	−1.583	0.285	0.000
	Pill*Income	0.091	0.094	0.475
	Enhanced*Job	0.349	0.146	0.076
	Shelf-life*Urban	0.501	0.168	0.028

Let us consider results for strawberries. There are few significant interactions between the *enhanced* version and the socio-demographics, and we only observe a positive WTP for higher job categories. More significant in-

teractions are observed for the strawberries *grown in the open* or sold with a *pill supplement*. In the case of the supplement, there is a rejection by white collar workers, households with children and who spend more on food; men, people who live as a couple or have a higher education are however more willing to pay for strawberries sold with a pill supplement. Concerning the category *grown in the open*, we observe a positive WTP for people with a higher job, who spend more on food, and with a lower education; to a lesser extent (coefficients significant at the 10% level only), there is a rejection by urban dwellers and couples. Concerning the extended *shelf-life*, the only significant interaction is a positive WTP for urban dwellers.

We observe more significant interactions between main effects and socio-demographics in the case of lettuce, especially concerning the *enhanced* version of the product: there is a positive WTP for younger, urban people with a white collar job, and to a lesser extent, there is rejection by people with a higher education (significant a 10% only). Concerning the *pill supplement*, we observe that men and large households with a higher income have a positive WTP, while people with a higher job category, more children and who have a larger weekly budget for food, have a negative WTP. Concerning the lettuce *grown in the open*, a positive WTP is associated with older people, households with children and who spend more on food; men and urban dwellers however have a negative WTP. As far as the colour of the leaves is concerned, people with a white collar job and a higher food budget have a positive WTP for *redder* lettuce. Finally, concerning price, men and those with children are less willing to pay for lettuce.

Tab. 6: Normalised parameters estimates for main effects and interactions for lettuce. Log Likelihood = −728.022

		Lettuce		
		Coeff.	Std Error	p-value
Main effects	Price	−1.000	0.290	0.097
	Open	−0.640	0.324	0.340
	Pill	−2.594	0.487	0.010
	Enhanced	0.743	0.224	0.110
	Red +	−2.950	0.264	0.000
Interactions	Open*Gender	−0.830	0.183	0.028
	Open*Age	0.022	0.005	0.022
	Open*Urban	−0.554	0.120	0.026
	Open*Education	0.292	0.122	0.248
	Open*Children	0.910	0.164	0.008
	Open*Spending	1.206	0.182	0.001
	Pill*Gender	1.419	0.241	0.005
	Pill*Job	−0.881	0.205	0.039
	Pill*HHsize	0.878	0.109	0.000
	Pill*Children	−2.689	0.283	0.000
	Pill*Spending	−1.659	0.268	0.003
	Pill*Income	0.487	0.087	0.007
	Enhanced*Age	−0.019	0.005	0.046
	Enhanced*Job	1.169	0.148	0.000
	Enhanced*Urban	0.786	0.121	0.002
	Enhanced*Education	−0.459	0.124	0.074
	Red*Job	1.001	0.171	0.005
	Red*Spending	0.916	0.188	0.019
	Price*Gender	−2.254	0.498	0.029
	Price*Children	−2.062	0.391	0.011

Let us consider results for lamb. We observe a positive WTP for *enhanced* lamb for urban people, while men, larger households and those with a higher income tend to reject it. A lamb marketed as *GM* is rejected by people with a white collar job category, urban dwellers, and those who spend more on food; it is also rejected by older people with a higher income, although those coefficients are only significant at the 10% level. We observe a positive WTP however for households with children. Finally, the *free range* lamb is preferred by larger households and people with a higher job, and is somewhat rejected by people with a higher education level (coefficient significant at 10% only).

Tab. 7: Normalised parameters estimates for main effects and interactions for lamb. Log Likelihood = −684.363

		Lamb		
		Coeff.	Std Error	p-value
Main effects	Price	−1.000	0.082	0.000
	Enhanced	3.482	0.312	0.000
	GM	1.164	0.336	0.109
	Free range	0.498	0.262	0.378
Interactions	Enhanced*Gender	−2.322	0.257	0.000
	Enhanced*Urban	1.069	0.198	0.012
	Enhanced*HHsize	−0.784	0.091	0.000
	Enhanced*Income	−0.949	0.204	0.031
	GM*Age	−0.789	0.194	0.060
	GM*Job	−1.145	0.193	0.006
	GM*Urban	−0.959	0.194	0.022
	GM*Children	1.203	0.117	0.000
	GM*Spending	−1.237	0.118	0.000
	GM*Income	−0.737	0.193	0.077
	Free Range*Job	1.367	0.193	0.001
	Free Range*Education	−0.785	0.195	0.062
	Free Range*HHsize	0.362	0.080	0.037

7 Interpretation & Conclusion

Results from the survey are generally in line with what could be expected: pill supplements or GM products are rejected, while free range products or products grown in the open are positively valued. It appears as well that the enhanced, 'healthier', version of these products are also positively valued, although to a lesser extent.

Looking at the relative values of coefficients for each product, it appears that respondents are more wary of rejecting options appearing as 'unnatural', than to accept other versions; although people showed some willingness to pay for enhanced versions, their prime interest lies with goods produced in the most natural way possible, albeit utopian in the case of lettuce and strawberries. In that respect, functional aspects of the food appear to be a secondary issue to respondents in our survey, who are more focused on natural/unatural issues.
We can also observe that normalised coefficients show that products with higher added value[5] command a higher willingness-to-pay with respect either to the enhanced or more 'natural' version; this ranking is also verified for standard products sold with pill supplements and for GM lamb. This could also be explained by some of our focus groups results, showing that people were more enthusiastic about lamb than strawberries, which were perceived as already healthy.
One result remains puzzling in the case of lettuce: although respondents were told that a red tinge was synonymous with higher levels of antioxidants, this quality is strongly rejected.

Looking at interactions between main effects and the socio-demographic characteristics of our sample, a few patterns can be observed. Concerning enhanced products, and although there were few significant coefficients, it appears that urban people holding a higher job position are more willing to pay; women, smaller households with less income are also more likely to buy in the case of lamb.
Concerning pill supplements, we can distinguish two groups. First, there is a marked rejection by women, people with a white collar job, and households with children who spend more on food per week; second, couples, larger

[5] From high to low: lamb, strawberries, lettuce.

households with a higher income or a higher education have a positive WTP for pills. Rejection can be interpreted as respondents who are conscious of what they eat or give to their children; in the case of acceptance, a larger households do not necessarily refer to families, but possibly to adults sharing accommodation and with available income: in this case, the pill supplement could be perceived as a practical way to improve one's diet. The case of GM lamb is quite similar, with rejection by people with white collar jobs and who spend more on food; there is acceptance by younger people, which could be down to the fact that they are more familiar with biotechnologies and therefore do not resent it as an intrusion in their lifestyle, but more surprisingly by people with children or who have a rural dwelling, two characteristics which are usually associated with more traditional lifestyles.
As for ways of production which could be perceived as more natural, these are favoured by rural dwellers, although they are more likely to know that strawberries and lettuce are necessarily grown under plastic, people who spend more on food, who have a lower education, and those who have a higher job position,[6] which could hint towards more traditional values. To a lesser extent, they also seemed to be preferred by larger households, women with children, and to be rejected by couples.

Results are in line with findings from other studies, as seen in section 2: respondents have a positive willingness to pay for functional foods, especially women. We find however that this WTP is stronger for animal than for plant products, and that younger people could be more willing to pay than their elders.
Our results show that there is an economically viable market for functional foods, such as those we examined. Care should be taken in the way those products are presented however, as our findings show that people are strongly polarised against anything that may be perceived as artificial or genetically modified.

[6] Although this may seem contradictory, coefficients are to be understood all other things being equal.

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Appendix

Example of choice sets given to repsondents

Q6. STRAWBERRIES

Please choose one and only one alternative for each question

Question	Choice A	Choice B	Choice C
6·1	standard -- £2.99	standard + pill longer shelf-life £3.49	enhanced -- £3.99
6·2	standard + pill -- £2.49	enhanced longer shelf-life £2.99	grown in the open -- £3.49
6·3	standard + pill longer shelf-life £3.49	enhanced -- £3.99	grown in the open longer shelf-life £2.49
6·4	grown in the open -- £3.99	standard longer shelf-life £2.49	standard + pill -- £2.99
6·5	grown in the open longer shelf-life £2.99	standard -- £3.49	standard + pill longer shelf-life £3.99
6·6	standard + pill longer shelf-life £2.99	enhanced -- £3.49	grown in the open longer shelf-life £3.99
6·7	standard -- £3.49	standard + pill longer shelf-life £3.99	enhanced -- £2.49

Q8. LETTUCE

Please choose one and only one alternative for each question

Question	Card	Choice A	Choice B	Choice C
8·1	2	standard greener £0.60	standard + pill redder £0.80	enhanced greener £1.00
8·2	6	grown in the open greener £1.00	standard redder £0.40	standard + pill greener £0.60
8·3	8	grown in the open redder £0.60	standard greener £0.80	standard + pill redder £1.00
8·4	9	standard + pill greener £1.00	enhanced redder £0.40	grown in the open greener £0.60
8·5	13	standard redder £0.40	standard + pill greener £0.60	enhanced redder £0.80
8·6	15	enhanced redder £0.40	grown in the open greener £0.60	standard redder £0.80
8·7	16	standard greener £0.80	standard + pill redder £1.00	enhanced greener £0.40

Q10. LAMB

Please choose one and only one alternative for each question

Question	Card	Choice A	Choice B	Choice C
10·1	1	GM free range £4.99	enhanced GM £4.49	£3.99
10·2	5	£5.49	enhanced GM £4.99	enhanced GM free range £3.99
10·3	7	enhanced £4.49	GM free range £4.99	enhanced GM free range £5.49
10·4	9	enhanced GM £4.99	enhanced £4.49	GM £3.99
10·5	10	free range £4.99	GM £3.99	£5.49
10·6	11	£3.99	enhanced GM free range £3.99	enhanced free range £5.49
10·7	12	GM free range £4.49	enhanced GM free range £5.49	free range £4.99