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# Food safety issues and the BSE scare: some lessons from the French case

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The Bovine Spongiform Encephalopathy (BSE) scare began after the UK Minister of Health admitted a possible link between the BSE prion and the Creutzfeldt-Jakob disease contaminating humans. The paper outlines a survey conducted in the area of Rennes to analyse consumer behaviour after the BSE crisis. A contingent scenario was proposed to determine the willingness to pay (WTP) for beef which should not transmit CJD using a mix of the referendum method and the bidding process. The variables considered as main determinants of the WTP have been selected. The study concludes with the interests and limits of the method used, and the implications of the BSE scare on food policy. In fact, the 'mad cow' disease raises the problem of loss of public confidence and the means to restore it. Consumers are waiting for a greater transparency or 'traceability' and, according to the survey, would accept to pay for it.

Keywords: BSE, willingness to pay, hedonic pricing, contingent valuation.

## Introduction

As for other sectors, competitiveness has become a key issue for food industry and agriculture. Focused on growth, profits and efficiency, firms try to reduce their costs through new production patterns, new chemical processes and additives, or animal drugs and stimulants. In many cases the least-cost combination of factors relies on the substitution of cheaper industrial by-products for natural inputs. At the same time foodstuffs appear as a source of additional health risk for consumers, all the more so as people are better educated and more aware of health hazards. This explains the process of 'social amplification' occurring when the food safety system is defective.

The number of food poisoning incidents associated with Salmonella, Listeria, or more recently with hamburgers contaminated with Escherichia Coli in Arkansas is increasing in both developed and developing countries. But the most important food scare remains the Bovine Spongiform Encephalopathy (BSE) crisis when the emphasis shifted from beef industry to health concerns. This crisis expresses a main loss of public confidence in food, especially beef, and also farm production systems.

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This paper deals with the behaviour of French consumers when the possibility of contracting Creutzfeldt-Jakob Disease (CJD) from eating beef infected by the BSE agent first appeared possible. The first section introduces the French context in light of the preceding ‘veal crisis’ and the main effects of the BSE scare. Section 2 provides the theoretical framework used to measure the value individuals attach to improvements in food safety and the methodology. Section 3 presents the characteristics of the sample surveyed. Section 4 analyses the results, and Section 5 is devoted to concluding comments.

## The French context

In France, the impact of the ‘mad cow’ crisis presents similar features with the consumers’ reaction to the use of illegal hormones (dethylstiboestrol or DES) in veal production for growth purposes. Incidents were reported, particularly in Italy where veal consumption is considerable. Adolescents were suffering from hormonal irregularities and veal had come under suspicion as a possible cause. Campaigns carried out by consumer associations in September 1986 against the use of steroid agents for veal sharply reduced the consumption of this meat, which dropped by 40% in the following weeks. However, this drop occurred in the context of a downward trend due to the development of industrial veal farming which carried a bad image, and also to the substitution of turkey meat for veal.

Table 1 indicates that the decrease in veal consumption began in the sixties, was interrupted by a short period of increase, from 1974 to 1979, and has been decreasing since.

Concerning BSE, the crisis began at the end of March 1996 when the UK Minister of Health admitted a possible link between the BSE prion and CJD in humans. Although there was no direct evidence that BSE could be transmitted to humans, the evidence was sufficiently suggestive for the beef sector to collapse immediately. As for the 1995 consumption level, the losses reached 117,000 tons in 1996 (Agreste, 1997). But as concerns veal, this collapse occurred in a period characterised by a negative tendency in red meat consumption. As indicated in Table 1, the average decrease in beef consumption was 1% in the eighties and the decrease rate reached 1.5% during the mid-nineties, just before the BSE crisis.

Since this crisis, numerous efforts have been made to reassure consumers of the safety of bovine products. For example, voluntary labelling rules with a cattle identification scheme giving information about the age and origin of the animal, the method and place of as well as the slaughter house have been implemented. In order to rebuild consumer confidence, a specific label ‘French meat’ has been created as well as a logo. Publicity campaigns have taken place to explain that this label is a guarantee of safe meat. According to a survey made in February 1997 by the most important French supermarket chain, consumer confidence is now returning since about two-thirds of the people buying meat do not worry about BSE and one-third remain anxious. Nevertheless, 25% have changed their consumption pattern and 6%

**Table 1** Yearly rates of growth of meat consumption per capita in France from 1950 to 1995

	1950–59	1960–73	1974–79	1980–89	1990–95	1950–95
Beef	1.9	1.1	2.1	-1.0	-1.5	0.6
Veal	1.3	-1.0	2.5	-2.7	-1.8	-0.5
Pork	5.8	2.9	2.8	1.1	-0.3	2.7
Poultry	6.2	6.2	1.8	1.9	0.0	3.9

Source: Combris (1997).

declared they did not eat any meat at all, whereas before March 1996 the figure was only 2% (Agra Presse, 3 March 1997). Clearly, BSE damaged confidence among consumers and the latest scientific results which strongly suggest that CJD is caused by BSE exposure are not likely to restore it.

## **Theoretical framework**

The situation can be analysed as an exposure to undesirable foodborne effects which can affect the health of the consumer (Vermersch and Weaver, 1996). But complete avoidance of the exposure is possible since the consumer can choose alternative products that are supposed to be safe. This can be defined as averting behaviour by substituting other products for risky food to reduce or eliminate the effects of the externality exposure. In the literature, averting expenditure is considered as a measure of reducing exposure to health risks. But we know that such a measure is a lower limit of the 'true' value people give to the health risk reduction. Following Henson, the theoretically correct measure of the value the individuals attach to better food safety is their willingness to pay for safer foods, i.e., the largest monetary amount they are willing to pay for a specific improvement in food safety (Henson, 1996).

Since there is no market for health and food security, we have no direct evaluation of this monetary amount that people accept to pay. So we have to construct hypothetical markets using survey techniques to elicit the willingness to pay (WTP) for changes in health risks. Doing this we assume the existence of a market for this good, and its value is inferred from the marginal rate of substitution between money income and the good. This approach may be inaccurate because of the possibility of biased responses due to hypothetical and strategic bias, starting point bias and information bias. Consequently the design of the scenario and the payment vehicle are of the utmost importance. For instance, eliciting expressions of people's behaviour toward serious illness supposes an integrated view of serious illness and death in the context of a person's overall life-cycle experience. Fabian *et al.* proposed a four-module approach: the first one deals with health experience, the second with health cost and defensive measures, the third is related to risk perception and risk behaviour, and the fourth presents the contingent valuation questions. This four-module approach requires 3 hours, including breaks for relaxation (Fabian *et al.*, 1994).

Basically our hypothetical scenario is built so as to elicit the WTP of the consumers to have beef which should not transmit CJD at their disposal, knowing that the zero-risk does not exist. To try and avoid bias, a first survey was conducted in Brittany using a non-representative sample of 320 customers interviewed close to the butcher's shops and supermarkets. It appeared that the way in which the contingent payment was proposed was not the best. Indeed, people were asked about the surplus they would accept to pay expressed as a percentage of the meat price, and consequently the variance of the WTP obtained is low. To avoid this problem we have proposed absolute values.

Concerning the structure of the contingent valuation questionnaire, the method used to elicit the WTP is a mix of the bidding process and the referendum method. In the former, where people are asked whether they are willing to pay a certain amount, the starting point may be seen as introducing a bias. In the latter, people are asked to answer yes or no to a question containing a determined value, this value varying randomly between two limits. This method supposes a large sample, thus considerably increasing the cost of the survey. To avoid the disadvantages of each method, a new procedure to implement the iterative bidding WTP question format has been designed. The surveyor proposes an interval of monetary values instead

of a precise amount. This interval is varied systematically across the sample according to the distribution of WTP obtained in the pre-test study. People answer yes if their WTP belongs to the interval, and no if it does not.

The pilot survey was conducted during Autumn 1996. The survey itself was directly administered to 700 people in Spring 1997. Random sampling was used: census tracts within each district area of Rennes and blocks of buildings were chosen randomly. Every lodging within each selected block was assigned a number between 1 and  $n$ ,  $n$  corresponding to the number of households in the block of buildings. Then a random number between 1 and  $n$  was chosen to determine the lodging where interviewing started. The procedure was uniformly specified for all interviewers and continued until the previous number of questionnaires was reached.

### Characteristics of the sample

Although 700 questionnaires were administered only 658 were completed and usable. Because the last census is not recent enough (1990), it is difficult to compare the sample to the population.

Not surprisingly, 65% of all respondents were women. This high proportion was expected, since the person interviewed was the main food purchaser in the household. This fact also explains why 20% of the persons interviewed belong to a household whose head is a student; the same percentage is retired, 10% are unemployed and half have employment. The distribution of the respondents according to their age, Fig. 1, correlatively indicates a relatively young population with a large number of people under 25.

As for the level of education, according to the International Standard Classification of Education of UNESCO, 6% of the respondents have a diploma corresponding to compulsory education, 25% to lower secondary education, 17% to upper secondary education and 43% to higher education. Nine per cent have no diploma, which does not mean that their education level is very low, but probably corresponds to people with a secondary and even an upper secondary education.

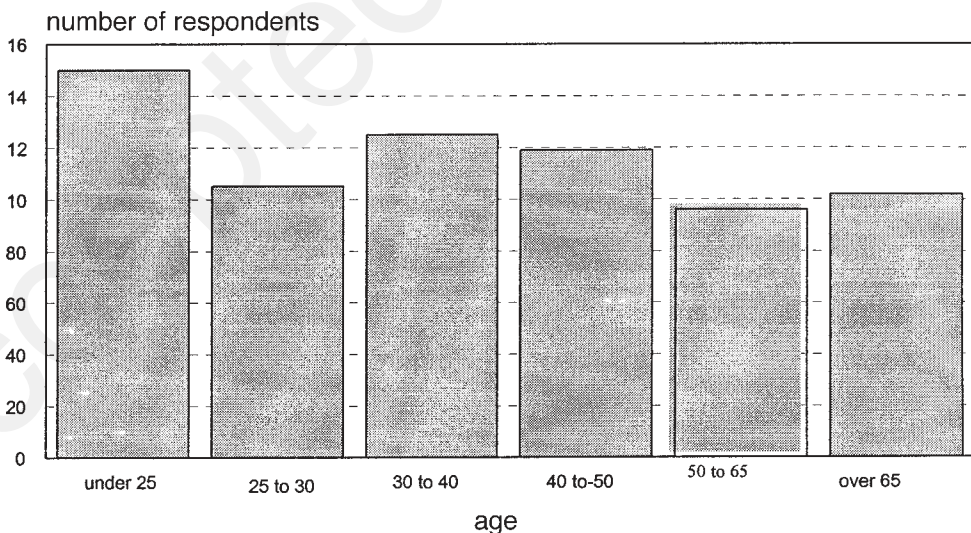


Figure 1 Sample distribution according to the age of the respondents

The questionnaire asked the main food purchaser of the household where he or she was buying the meat. Around two-thirds stated that their purchases were done in supermarkets. Twenty-seven per cent of the respondents purchased their meat from the butcher, whilst 5% bought it at markets or farms. Other responses represent 3% (discount stores...). The main reasons explaining the place of purchase are quality (30%), proximity (29%) and low price (26%). Among the other reasons are time convenience (7%), and wide range of choice (4%).

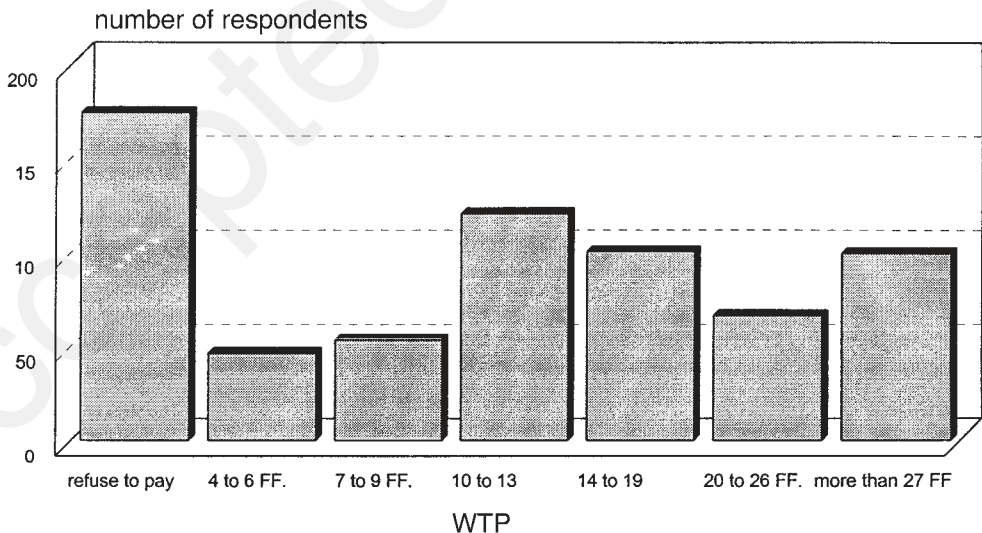
Concerning the changes in food habits, since the ‘mad cow’ crisis, 31% of the respondents expressed a greater concern about food safety through new beef eating habits. Twenty-four per cent of the people who have changed their consumption pattern eat less beef, and just as many have substituted fish and poultry meat for beef.

### Results: the willingness to pay for beef which would not transmit CJD

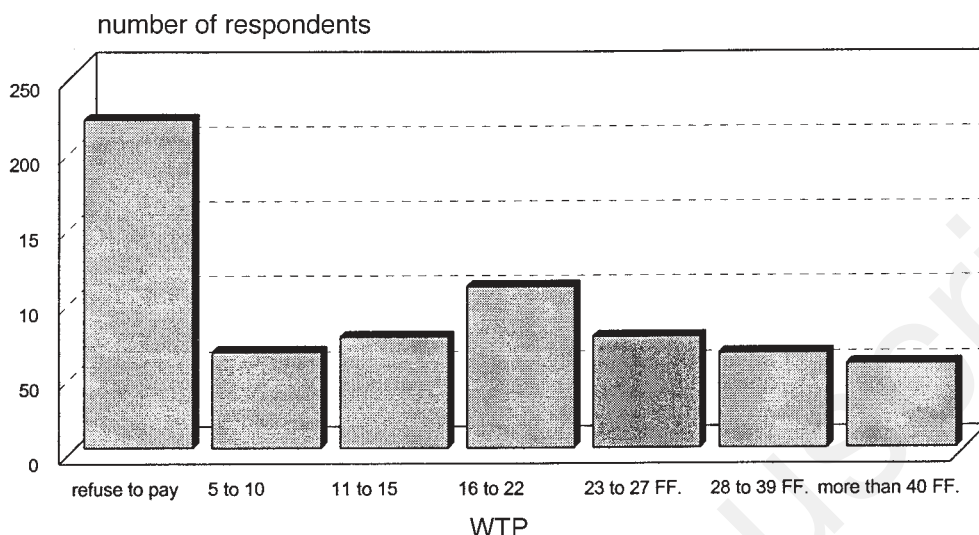
After a set of questions concerning the consumption pattern, the reasons for possible changes, the attitudes about labels and sanitary norms, people were asked to reveal the additional amount of money they would accept to pay for beef which should not transmit CJD. More precisely, the willingness to pay was estimated for two different goods: first-price meat, such as minced steak for which a slight risk exists; and high-quality beef which is supposed to be risk-free. The quality was associated to a price: FF50 in the first case, FF100 in the second case.

The acceptance according to the various classes of bids for first-price meat is presented in Fig. 2. On the whole, the rate of acceptance is high, since the zero bids represent less than 24%. The distribution indicates a large number of respondents in the highest class of bid, which suggests that the fat tail problem has not been fully overcome. The mean WTP reaches FF11.06 including the zero bids.

For high-quality beef the results, as indicated in Fig. 3, are somewhat different with a lower rate of acceptance, since the zero responses represent about 29% of the total. On the other hand, there are fewer respondents in the highest class of bid. Even if the zero bids are more numerous than in the previous case, the mean WTP reaches FF13.66 including the zero bids.



**Figure 2** Willingness to pay FF50 per kilo of beef which should not transmit CJD



**Figure 3** Willingness to pay FF100 per kilo of beef which should not transmit CJD

Although there is a high rate of positive responses, it is interesting to detail the motives of the zero bids since they do not all have the same meaning. Some people are unable to pay a greater price for safer meat because of their revenue constraint, or the constraint upon their food budget. These zeros can be seen as ‘true zeros’. For another category of consumers the zero response can be considered as a ‘protest zero’ since these people think that the price of meat is high enough, and they should not have to pay for improved food safety. They believe that the extra cost implied by a safer food should not be borne by the consumer. From an econometric point of view these zero bids are different from the ‘true zeros’. To detect the various types of zero-responses, the WTP questions were followed by ‘debriefing’ questions to determine the main reasons for refusing to pay for safer meat. Table 2 presents the motives of the zero-responses for the two types of beef.

Table 2 indicates that the protest bids are equivalent for the two types of meat (8.9%). Logically, the most significant difference is due to the revenue constraint which plays a more important role in the zero-responses for the more costly meat. Otherwise, the motive ‘the

**Table 2** Motives of the zero bids

	FF50 meat		FF100 meat	
	No.	%	No.	%
Not enough information	5	0.7	5	0.7
Do not care about food safety	7	1.0	6	0.9
Cannot pay more	17	2.4	34	4.9
The label ‘French meat’ guarantees the safety	8	1.1	13	1.9
Total safety is impossible	40	5.7	39	5.6
The extra price must not be borne by consumers	62	8.9	62	8.9
Other	28	4.0	41	5.9
Total of the zero responses	167	23.9	200	28.7
Positive responses	533	76.1	498	71.3

“French meat” label guarantees the food safety’ is more widespread for the first-quality meat than for the second choice. On the whole this label inspires great confidence since to the question about the attitude *vis à vis* the label, 72% of the respondents answered that the labels are a good guarantee of quality. On the contrary, Table 2 indicates that 5 to 6% of the total responses are zero in these cases because of the impossibility to guarantee total food safety.

To have a more comprehensive understanding of the WTP and explain the differences in the bid choice, it is necessary to dispose of an explanatory model. Among the various estimation procedures available we have chosen the parametric model of choice of Hannemann (Hannemann, 1984) which is consistent with the utility theory. Basically, the bidding process is interpreted as a utility maximisation process. But since some components of the utility function of the respondents are unobservable, we have introduced a random unobserved term of utility. Specifying a functional form for the observable term of utility and assuming a probability law for the random component, it is possible to estimate the parameters. Assuming a logistic law, logit models have been estimated.

Thirteen variables, suggested by economic theory and the pilot survey results, have been selected as important determinants of WTP. The detailed results of the logit model are presented in Appendix 1. The obtained coefficients for components of variables are related to the distribution function of the WTP. A positive coefficient increases the value of this function, everything else being equal. Consequently, people concerned by the component considered tend to accept lower bids than the others.

One of the most significant variables from a statistical point of view is the starting bid. Though we tried to eliminate its influence, it remains highly significant.

Now, three categories of variables can be drawn, with at least one component with a significant influence on the choice of the final bidding class.

First, there are the socio-economic variables: occupation of the interviewee and his level of education. Compared to employed persons, people who are unemployed tend to accept lower bids. Of course this result was expected. The other result was less expected: people with lower education level accept a higher final bidding class than those with a high education level. This result can be interpreted as a greater possibility for higher educated people to obtain information about the sanitary quality of the products.

Second, there are variables determining the behaviour of the consumer when he or she decides to make a purchase. Signs of significant coefficients are consistent with intuition. As expected, people who are not eating labelled chickens tend to accept lower bids and those purchasing organically grown products have a high WTP. The only result which is in opposition with intuition is related to the item ‘consumption of farm-purchased product’, since people usually buying farm products accept lower bids than other respondents. This can be due to the fact that they feel they have lower risks because of a more ‘natural’ way of consuming.

Finally, perception variables, i.e. all items related to the degree of confidence about various criteria given on the product (freshness, geographical origin, the way the products are grown, the price as a sign of quality) are considered. Clearly people sensitive to these variables tend to accept a higher bid than the others. This influence is especially significant for the geographical origin, which means there is some correlation between the quality of certain products and the landscapes where they are produced. It is interesting to see the role played by variables linking quality and price. A large part of the sample accepted the idea that good quality involves a high price (59.3% accept this idea for organically grown products and 74% for labelled meat). In consequence, these people have a higher WTP.

This logit model has a low explanatory power ( $R^2$  of 6%). Nevertheless, the same level of

explanatory power has been found by Mora Zanetti with the same type of cross-sectional data. She obtained an adjusted  $R^2$  of 8% for OLS regressions (Mora Zanetti, 1998).

## Concluding comments

Two general comments can be drawn from this study. The first one is related to the method used, interest and limits, and the second about the BSE scare and food policy.

Designing and implementing efficient food policies implies valuing a wide range of non-market goods. Despite criticisms, the contingent valuation method remains the best approach. It has been used, for instance, to measure people's WTP to support legislation to improve animal welfare (Bennet, 1997), or consumers' attitudes faced with the risk of Salmonella (Henson, 1996) The use of the contingent valuation method has become more and more complex and requires a precise and constraining elicitation procedure to get closer to real market situations. These procedures make it possible to obtain a better valuation of WTP.

Nevertheless, the value of the results relies upon the hypothetical scenario proposed to the consumers to elicit the marginal rate of substitution of money income for safer beef. With regard to the pilot survey, the procedure adopted and the payment vehicle expressed in absolute value give better results. In the pilot survey, people were asked about the percentage of the meat price they would accept to pay. We obtained a WTP ranging from 5 to 7%. In a survey of supermarket shoppers it was found that people were willing to pay 5 to 10% higher prices for fresh produce certified pesticide residue-free (Ott, 1990). Similar results have been found for seafood safety with a WTP reaching 10% (Vessels and Anderson, 1995). The new procedure gives higher results since the mean WTP ranges from 22% for the first-price meat to 13.7% for the best quality.

However, the iterative bidding procedure adopted did not solve the starting bid bias. This means that consumers misunderstood the market situation proposed. The payment scenario had not been convincingly described and interviewees were more or less influenced by the first bid. The good we are trying to assess, the health risk related to possibly contaminated beef, is very uncommon. Normally, food safety is included in the livestock products purchased by the consumer. The dissociation between the two components can seem artificial to the interviewees. The hypothetical scenario might be improved and to avoid any misunderstanding, respondents have to be better informed about the specific good values and the various attributes of the livestock products, including environmental and animal welfare implications. On the other hand, the bias could be compensated for by some econometric adjustment to WTP.

If we now turn to the food policy side, BSE questions the whole food and farm system because of contaminated animals entering the human chain for profit reasons only. Beyond the ethical aspects, which are not examined here, the 'mad cow' crisis raises the problem of loss of public confidence and the means to restore it.

Although comforting messages from governments, authorities, the meat industry or farmers' organisations are not convincing, people have no other source of information. Understanding consumers is the key to restoring public confidence. From this point of view, our survey gives interesting information. Clearly, labels with geographical indications are an assurance to the public through greater transparency or 'traceability' in the food chain from the farmer to the retailer.

To avoid undesirable foodborne effects, there is a growing demand for safe products expressed by a significant WTP (14 to 22% of the price of the beef). This means the development of a market which allows consumers to purchase the livestock products that they wish,

these products presenting adequate information about their origin and the production practices. But in the long run, the risk of a dual market cannot be ruled out: one for people able to pay a greater price for labelled and guaranteed products, the other for the poorer persons who accept health risks provided that the beef price is low. This would lead to discriminating consumers with regard to the health hazard exposure which is unacceptable from an ethical point of view. Such a situation is all the more unacceptable since the mad cow risk and the CJD risk are due to worse feeding conditions. If the right to safe food is recognised, the consequence is a comprehensive food policy at the European level to protect human health, taking into account animal welfare and environmental considerations. Nevertheless such a policy could lead to another type of dual market. But the discrimination would be related to the type of meat: white meat (chicken and pork) for the poorer, and red meat for the wealthy.

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**APPENDIX**  
**Results of the ordered logit model**

Variable	Variable components	Estimated coefficient	Standard error
Constant	—	-1.96*	0.36
Starting bid	—	-0.06*	0.01
Occupation of the interviewee	Employed	ref	—
	Unemployed	0.49***	0.26
	Retired	0.01	0.22
	Student	0.11	0.20
Level of education	Without diploma	-0.35	0.29
	Compulsory education	-0.52***	0.32
	Lower secondary education	0.02	0.19
	Upper secondary education	0.11	0.20
	Higher education	ref	—
Consumption of pre-prepared meals	Yes	ref	—
	No	0.26***	0.15
Consumption of farm purchased products	Yes	0.25***	0.15
	No	ref	—
Consumption of labelled chickens	Yes	ref	—
	No	0.32***	0.18
Place of fruits and vegetables purchased	Large supermarket	0.20	0.19
	Supermarket	ref	—
	Groceries	0.79*	0.29
	Market	-0.22	0.19
	Farm	-0.14	0.93
	Hard discount	1.33**	0.68
Purchase of organically grown products	Yes	-0.26	0.17
	No	ref	—
Pay attention to general indications	Yes	ref	—
	No	0.13***	0.27
Pay attention to geographical indications	Yes	ref	—
	No	0.56*	0.15
Higher price for a labelled meat justified	Yes	ref	—
	No	0.59*	0.20
Higher price for organically grown products justified	Yes	ref	—
	No	0.55*	0.20
Best quality of organically grown fruits and vegetables recognised	Yes	ref	—
	No	0.36	0.20

Number of observations: 658; log likelihood (complete model): -1287.95.

\*Significant at 1% level; \*\*significant at 5% level; \*\*\*significant at 10% level.