

Research report

Food and sustainability: Do consumers recognize, understand and value on-package information on production standards?

Carolien T. Hoogland, Joop de Boer*, Jan J. Boersema

Institute for Environmental Studies, Vrije Universiteit, De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands

Received 28 April 2006; received in revised form 1 November 2006; accepted 7 November 2006

Abstract

We tested how consumers recognize, understand and value on-package information about food production methods that may contribute to a more sustainable agriculture. Nine copy tests were formed, each containing one out of three products and one out of three panels of information. The products were (1) fillet of chicken, (2) semi-skimmed milk and (3) fillet of salmon. The panels of information were (a) a certified organic logo and details about the animal welfare standards of organic products, (b) just the logo, or (c) a statement in which the product was attributed to the world market. About 371 customers of a supermarket in the city of Amsterdam filled in a questionnaire, which included a subset of three copy tests. The results showed that many consumers did not realize that the organic logo already covers all the standards. They were inclined to underestimate the distinctive advantage of the logo; products with logo and details got higher ratings of positive attributes but were also considered more expensive. As a consequence, the detailed information panels enabled consumers to choose more in agreement with their personal values but the net impacts on purchase intentions were small.

© 2007 Elsevier Ltd. All rights reserved.

Keywords: Food choices; Sustainable consumption; Transparency; On-package information; Labelling; Organic products

Introduction

On-package information about food production methods is increasingly relevant for those consumers who want to differentiate between conventional products and products with distinctive advantages in terms of moral and health aspects of eating (Caswell, 1997). This type of product information is also one of the promising instruments for policy makers in government and industry who aim to foster sustainable consumption and production patterns (OECD, 2001). Since a series of regulatory failures and food scares within Europe (Vogel, 2003), more transparency may even be considered crucial to secure a healthy, nutritious diet for consumers and a more sustainable food system for society. However, there are many discussions in the literature about the real access of consumers to information about production and processing technologies, for example, through various labelling systems (Conner, 2004; Fischler, 1980; Nestle, 2002;

Tansey & Worsley, 1995). In fact, the mechanisms for consumers to express their values in purchasing decisions are limited and they may easily run into problems if they are overwhelmed by too much information or misled by too little (Andrews, Netemeyer, & Burton, 1998; Wansink, 2003). One of the options for food producers is to limit the amount of on-package information to a label, such as a certified logo or an organic seal that is intended to symbolize a whole set of organic production standards. Another option is to include a panel with more details about such standards. The question that we want to address in the present experiment is how consumers recognize, understand and value sustainability-related on-package information in both forms.

To develop an understanding of the potential impact of different labels on more sustainable food choices, we designed an experiment in which realistic circumstances are combined with theory-based insights on information processing and decision-making. Our approach builds in particular on the relatively transparent character of organic agriculture. Although the organic sector is not the only form of agriculture that claims to be more sustainable than

*Corresponding author.

E-mail address: joop.de.boer@ivm.falw.vu.nl (J. de Boer).

current practices, it has a well-defined and certified set of standards, which makes it much more transparent than the conventional sector (Pretty, Ball, Lang, & Morison, 2005). The difference in transparency between organic and conventional agriculture may be reinforced by contextual factors, such as marketing strategies. In the United States, for example, several food companies that are specialized in organic products have put a lot of effort into creating an image of being completely organic in their supermarkets (Klintman & Boström, 2004). This strategy chosen by supermarkets that often serve the upper part of the market may accentuate some typical cultural differences between the conventional and the organic food chain, such as the greater weight the latter gives to the principle of “naturalness”. In Europe, on the other hand, there seems to be less polarization between these food chains as it is more common that a supermarket provides both organic and conventional foods. The latter forms the context for our experiment.

The Netherlands, where our experiment was located, can stand as a good example of the European situation. Measured in organic sales per capita, it has a middle position among the Western European countries after forerunners as Denmark and Austria, and ahead of France and the United Kingdom (Wier & Calverley, 2002). About 80% of the households bought at least one organic product in the year 2004, but the total number of organic purchases is low; although the sector is growing, its market share is still less than 2% (Biologica, 2005). This combination of high familiarity and low sales may result from the fact that many supermarkets provide organic and conventional foods side by side. This presentation brings more consumers into contact with organic products, but it might accentuate the premium price of organic products rather than the underlying differences in production processes; the first is printed on front of the package but the latter are just symbolized by the logo of organic products (i.e., the certified Dutch “EKO” logo, which is in agreement with international standards for organic farming).

We focused our experiment on the transparency of products that are highly relevant from the perspective of sustainability. Traditionally, transparency is more important for perishables, such as meat and fish, than for other foods. Nowadays, meat and fish are also extremely relevant for the aim of sustainability. This aim may require that the inhabitants of Western countries change their food choices by consuming less meat and fish or by giving preference to meat and fish with an environmental advantage, such as organic products. The main rationale for this diet shift is that intensive feeding of animals is a rather inefficient means of producing dietary protein, which also causes a variety of undesirable environmental impacts (Heller & Keoleian, 2003; Smil, 2002). Until recently, protein products were usually marketed in a fairly “anonymous” or “low key” manner, as fresh, unpackaged products. Just like what happened with milk much earlier, however, meat and fish are increasingly packaged for sale in supermarkets,

which gives producers the opportunity to develop on-package information about, among other things, important characteristics of production methods (Tanner, Kaiser, & Wolfing Kast, 2004). Hence, we included meat and fish in our experiment and added milk as a third product for reasons of comparison.

The labels that we wanted to compare come in two general forms. The first is a panel with an organic logo and detailed information on organic production standards. The second is a panel with the organic logo only. From the perspective of consumers, the many differences between organic and conventional products may not all be equally interesting, but it is well-known that, for example, animal welfare is one of the more salient issues in North-western Europe (European Commission, 2005). Accordingly, organic standards to protect animal welfare may create distinctive advantages in the cases of meat, fish and milk. To find out to what extent consumers are aware of these advantages, we created two experimental conditions in which organic products are displayed either with or without detailed on-package information about animal welfare standards. For reasons of comparison, we added a third condition of on-package information in the form of a panel with the statement that the product comes from the world market and has been produced in compliance with legal standards. This control condition was meant to represent the standardized food that seems to come from nowhere in particular.

The reason to combine the statement on the product’s world market origin with an assertion of compliance with legal standards was that imported food may be seen as less safe than food with a national origin (Juric & Worsley, 1998; Nygård & Storstad, 1998). We wanted to neutralize such a view, because we were not interested in this type of country-of-origin issues. It should also be noted that the Netherlands is characterized by an open economy in an extended network of international trade and that this has its effects on consumers. Although for many consumers in Western Europe a quality food is first a product that comes from their own country, surveys in the European Union have shown that this argument mattered far less in the Netherlands (European Commission, 2004, p. 47). Hence, the marketing of both conventional and organic products is less focussed on country-of-origin issues than elsewhere.

The contrasting degrees of transparency created by combinations of products (i.e., meat, fish and milk) and on-package information (logo plus details, logo, or statement on world market) may impact on consumers’ beliefs about a product through changes in the profile of perceived product attributes and in the strength of intentions to buy the product under certain circumstances. Two crucial theoretical issues at this juncture are (a) the degree to which consumers are able and willing to go beyond the information given, such as the logo and the text, and (b) the relationship between depth of processing and the impacts of the information. The key role of the depth of information processing has been documented by

research into the impacts of nutritional and health claims (Andrews et al., 1998; Higginson, Kirk, Rayner, & Draper, 2002; Wansink, 2003) and agrees with more general work on dual models of information processing, which include peripheral versus central processing (Petty & Cacioppo, 1986), heuristic versus systematic processing (Eagly & Chaiken, 1993), system 1 versus system 2 (Kahneman, 2003) and impulsive versus reflective system (Strack & Deutsch, 2004). Although there are subtle differences between the various models and the corresponding terminologies, we will mostly use the well-known terms peripheral/heuristic and central/systematic processing. The general pattern is that consumers will only scrutinize information if there is sufficient processing time, cognitive capacity and intention to extract the meaning of a message. Hence, if there are no externally imposed restraints on processing time and capacity, differences in processing will depend on consumers' motives and beliefs.

Dual models of information processing assume that the peripheral/heuristic process starts automatically and that more deliberate modes of information may subsequently correct or override the initial intentions (Kahneman, 2003; Strack & Deutsch, 2004). Much research into consumer information processing aims to reveal, which cues consumers respond to and which heuristics they use to infer product attributes that are not observable at the moment of the purchase decision (see Kardes, Posavac, & Cronley, 2004). The relative power of potential cues, such as the product's price or brand name, depends to a great extent on the attention they get and the accessibility of the responses with which they are linked. If the cues' diagnostic value is high enough, the behaviour of consumers may seem to be largely controlled by the associations that come to their mind most easily. However, a crucial characteristic of dual models of information processing is the observation that impulsive response tendencies, such as an initial intention to purchase a product, can be modified or overridden in a more deliberate mode of operation (Chernev & Carpenter, 2001; Kahneman, 2003). The metacognition of wanting to strike a balance between price and quality is important here, as the positive intention to buy a product may be overridden by some negative considerations, for instance, about its price. As noted by Strack and Deutsch (2004), the cognitive procedure of negating (i.e., reversing purchase intentions) can only be executed in the reflective system (i.e., by central/systematic processing). In research among heterogeneous consumers, these processes are revealed by the signs of the correlations between purchase intentions and perceived product attributes (a pattern of only positive correlations would indicate impulse buying, a pattern of only negative correlations indicates impulsive rejection, and mixed correlations indicate at least some deliberation).

Based on these theoretical insights, the following levels of consumer responses can be distinguished. What many consumers seem to do when they give some attention to on-

package information is not more than simply looking at the information available and moving on (Higginson et al., 2002). This response will have no favourable consequences for an organic product in terms of perceived product attributes and strength of purchase intentions. A somewhat greater depth of processing involves that consumers look for what is familiar and rely on their immediate associations. If the organic logo is familiar to them, they can use it as a shopping aid and respond in a direction that is either favourable or unfavourable for the organic product, depending on the accessibility and the diagnosticity of their initial associations (including the premium price of organic products). If they also fully understand its meaning, providing any additional details about animal welfare standards is redundant and will have no impacts on the profile of perceived product attributes and the strength of purchase intentions. However, if the logo is not familiar or not fully understood, providing additional details can make a difference. Consumers may develop a purchase intention based on additional associations and affective responses (i.e., peripheral/heuristic processing) and/or logical links with their existing beliefs and values, under the metacognition of a balance between perceived price and quality (i.e., central/systematic processing). The results of these processes will be reflected by changes in the profile of perceived product attributes and the strength of purchase intentions. Depending on what consumers value and believe, the changes will run in a direction that is either favourable or unfavourable for the organic product. In addition, it may appear that consumers make too much of the information given by overlooking limitations and overestimating salient attributes.

How consumers respond depends in several ways on their value priorities. Value priorities will affect whether consumers pay attention to information on organic food, whether they are already familiar with such information and understand its meaning, and whether they give weight to food choice criteria that favour organic products. A number of studies have shown that buyers of organic food tend to give particular attention to potential negative influences on their well-being; they want control over all aspects of their lives (Homer & Kahle, 1988), avoid health risks (Schifferstein & Oude Kamphuis, 1998), and prefer a good conscience (Magnusson, Arvola, Koivisto Hursti, Åberg, & Sjöden, 2003). In addition, self-reported frequency of buying organic food is significantly correlated with endorsing universalistic values, such as the belief that people should care for the welfare of other people and for nature (Grunert & Juhl, 1995; Hoogland, de Boer, & Boersema, 2005; Thøgersen & Ölander, 2002). Obviously, this correlation presupposes a context in which consumers can learn; if they do not get enough opportunity to become familiar with the information that is of relevance for them, they may even become very confused about the meaning of labels and other symbols (Aarset et al., 2004; Verbeke, Ward, & Avermaete, 2002; Wessells, Johnston, & Donath, 1999).

In sum, the impacts of contrasting degrees of transparency can be assessed by considering profiles of perceived product attributes, purchasing intentions and value priorities. For that aim, we designed an experiment in the form of a copy test built in a questionnaire. Although this research strategy is less realistic than, for instance, a test market, it should be noted that typically “realistic” data, such as net changes in sales figures, are hard to interpret if the context is very competitive and many potentially confounding market forces come into play. In contrast, the present experiment examined consumers’ responses to on-package information under the condition that they have the time to read and interpret it.

We created a set of copy tests by combining three products with three types of information in varying order. Three sources of animal protein were selected, namely (1) fillet of chicken, (2) semi-skimmed milk and (3) fillet of salmon. It was expected that these products are about equally familiar to consumers and that purchasing these products gives rise to at least some concern, because each is relatively vulnerable to negative influences. The information on production methods was presented in three forms, namely (a) an information panel with the organic logo (i.e., the certified Dutch EKO logo) together with a number of details about the actual animal welfare standards of organic production processes, (b) a panel with just the EKO logo, or (c) a panel with the statement that the product comes from the world market and has been produced conform legal production standards. Because the issue of animal welfare is applicable to each of the products, it was possible to combine the three products and the three forms of information in a systematic way. Although the use of real products and real information on production methods improves the possibilities to generalize the results, it can never be completely ruled out that some of the newly formed combinations appear to yield idiosyncratic results. To control for such effects, the combinations were presented in varying order and each respondent was given only a subset of three copy tests from the set of nine.

Our main hypothesis links up with the fact that the two information conditions with the organic logo are formally equivalent. The question is whether they are also equivalent in the eyes of consumers, as reflected by perceived product attributes and strength of purchase intentions. Assuming that consumers are relatively familiar with the logo, our first hypothesis was that the EKO logo affects consumers’ beliefs about a product in comparison to a product from the world market, which was said to comply with legal production standards (hypothesis 1). However, assuming that consumers are not very familiar with the animal welfare standards on which the logo is based, our next hypothesis was that adding the detailed information affects consumers’ beliefs about a product in comparison to just seeing the logo (hypothesis 2). Finally, our third hypotheses was that adding the detailed information enables consumers to choose a product that is more in

agreement with their personal values than the other conditions (hypothesis 3). The latter hypothesis builds on the literature mentioned above, which showed that the intention to purchase organic products is significantly correlated with endorsing universalistic values, as indicated by the Schwartz Value Survey (Schwartz, 1992).

As the hypotheses are based on the inferences consumers make, it should be noted that some types of inferences might produce rather uninteresting results. These pertain to three potential effects of the number of sentences used to describe the animal welfare standards. The first potential effect is that the sheer number of sentences on the package, irrespective of their content, may work as a heuristic (or peripheral) cue under low processing motivation, bringing the participants to the conclusion that more is simply better (e.g., Eagly & Chaiken, 1993, p. 33). If the processing motivation is not low, a second potential complication may occur in the form of the set-size effect: a person’s judgment on a product often becomes more extreme in comparison with his initial attitude as more items of information are added (e.g., Eagly & Chaiken, 1993, p. 245). And the third potential complication is a cross-product-category version of the set-size effect (e.g., Kardes et al., 2004, p. 242), which happens if the panel with logo and details on a product alerts the participants to the idea that another product’s panel (with just the logo) is incomplete. What these potential effects have in common is that they would create an undifferentiated greater appreciation of the product with logo and details (first and second potential effects) and a more moderate appreciation of the product with just the logo (third potential effect). Accordingly, the uninteresting results can be distinguished by a uniform pattern of differences across all the perceived product attributes and intentions to buy the product. We will return to this point below.

Method

Design

A sample of Dutch supermarket customers was asked to fill in a written questionnaire. This was a booklet with a neutral cover page and a subset of three copy tests from the set of nine. The copy test involved a photographed image of a real product, showing in full colour the front of pre-packed food with a real price tag and an information panel, followed by questions on purchase intentions and beliefs about the product. The panels had been styled by graphic designers to give them a real-life character. The three copy tests were followed by questions about food choice criteria, personal values, food related habits, and socio-demographic characteristics. Each participant filled in the questionnaire about three different products (pre-packed fillet of chicken, a litre carton of semi-skimmed milk, and pre-packed fillet of salmon). The product was combined with one of three information panels (the EKO logo together with the actual animal welfare standards, just the

EKO logo, or a statement in which the product is attributed to the world market). Table 1 presents the information per product. Note that the participants could not compare the information between the rows, as neither the same product nor the same information panel was repeated within one questionnaire. The combinations were presented in varying order.

Purchase intentions and beliefs

The photographic presentation of the product was followed by three questions on purchase intentions. Participants were asked to imagine that they are in a supermarket and that they are planning to purchase a chicken (milk, salmon) product. They had to rate the probability that they would buy the depicted product on a 5-point scale under the condition of three specified motivational foci, namely “you want something easy”; “you want something sensible” and “you want something tasteful”. These foci were chosen to put the intentions into a meaningful context. Subsequently, participants were asked to rate on 5-point scales their agreement or disagreement with six statements about the depicted chicken (milk, salmon) product in comparison with other chicken (milk, salmon) products; the statements referred to six potentially relevant food choice criteria: “tastier”, “more expensive”, “more healthy”, “more animal friendly”, “safer”, and “better for nature and the environment”. The statements were formulated in comparative terms to avoid confusion with people’s beliefs about the qualities of each product type in general. In addition, participants were asked whether the information on the panel was novel to them (ranging from 1 “not at all novel” to 5 “novel”). This was done to check the familiarity of the

information conditions. After the subset of three copy tests, they were asked to rate the importance of the six food choice criteria on 5-point scales.

Values

Personal values priorities were measured using the portrait value questionnaire (PVQ), a respondent-friendly version of the Schwartz Value Survey (Schwartz, 1992), which presents values as portraits of people instead of abstract descriptions (Schwartz et al., 2001). From Schwartz’ circular value structure covered by the 40-item PVQ we selected four value types that we considered to be most relevant to food and sustainability and that also covered the four quadrants of the circle. This selection included all six items from the Universalism domain, a selection of those three items from the Security domain referring to personal rather than national security, all three items from the Power domain and all three items from the Hedonism domain. Each item consists of two sentences describing a person in terms of a value that is important to him or her. The female version of a Universalism item from the PVQ is “She thinks it is important that every person in the world be treated equally. She believes everyone should have equal opportunities in life.” An example of a Security item is: “She tries hard to avoid getting sick. Staying healthy is very important to her”. Respondents are asked to rate on a 6-point scale “how much like you” the person is.

Procedure

In January 2004, 500 questionnaires were distributed among customers of a large supermarket in Amsterdam,

Table 1
Content of the information panels for the three products

	Products		
	Fillet of chicken 263 g	Semi-skimmed milk 1 l	Fillet of salmon 263 g
Panel a (logo plus details)	Organic: <ul style="list-style-type: none"> ● Animal friendly stables ● Outdoor access ● Organic fodder; no artificial additives ● No beak clipping ● Minimization of manure production and energy use 	Organic: <ul style="list-style-type: none"> ● Animal friendly stables ● Outdoor access ● Organic fodder; no artificial additives ● No hom clipping ● Minimization of manure production and energy use 	Organic: <ul style="list-style-type: none"> ● Animal friendly basins ● Painless stunning/killing ● Organic fodder; no artificial additives ● Filtering and recycling of water
Panel b (logo)	EKO logo Price: 22.95/kilo amount: 6.04 euro EKO logo Price: 22.95/kilo amount: 6.04 euro	EKO logo Price: 1.15/l EKO logo Price: 1.15/l	EKO logo Price: 22.95/kilo amount: 6.04 euro EKO logo Price: 22.95/kilo amount: 6.04 euro
Panel c (world market)	<ul style="list-style-type: none"> ● From the world market ● Produced conform legal production standards Price: 7.95/kilo amount: 2.09 euro	<ul style="list-style-type: none"> ● From the world market ● Produced conform legal production standards Price: 0.55/l	<ul style="list-style-type: none"> ● From the world market ● Produced conform legal production standards Price: 19.95/kilo amount: 5.25 euro

which provides a small assortment of organic foods. Questionnaires were handed out on a weekday and on a Saturday, at nine, at noon, and at six. Through this schedule we hoped to generate a sample containing different kinds of consumers; elderly people, students, young mothers and yuppies tend to do their groceries at different times of the day. Customers entering or leaving the supermarket were approached and asked if they ever buy meat or fish. In this way, vegetarians who buy meat for their families were included in the sample, while people who are quite unfamiliar with the choice task of buying meat or fish were excluded. Those who agreed to cooperate then received a return envelope containing the questionnaire and a cover letter. Along with the questionnaire they were given a five Euro voucher to promote their participation. They were urged to send back the questionnaire that same week.

Response

A total of 371 questionnaires were returned, which amounts to 73% of those agreeing to cooperate. The sample consisted of 67% female respondents. Mean age was 51 years ($SD = 16$). The majority (85%) was born in the Netherlands. Half of the sample had enjoyed higher or academic education, rendering it a typical urban sample. The majority of the respondents reported cooking frequencies of five to seven times a week; meat eating frequencies of four to six times a week; fish eating frequencies of twice a month to once a week; and one or two glasses of milk a day.

Analysis

The data were subjected to analyses of variance, correlation and regression analyses. After the checks on design and methods, we started with a general analysis of the results by a set of ANOVAs with repeated measures, using the three information panels as a within-subjects factor; and the order in which the products and the information panels were presented as two between-subjects factors. The non-parametric Friedman's test for related samples and the Wilcoxon signed-rank test for paired comparisons were used as an extra check. Subsequently, we zoomed in on the features of the various combinations of products and information panels as a final check on the type of inferences consumers made.

Results

Checks on design and methods

Using the repeated measures design with the information panels as within-subjects factor and order of presentation as between-subjects factors, we performed an ANOVA on the ratings of the novelty of the on-package information. As expected, the panel with just the organic EKO logo

($M = 2.33$) was significantly less new to most respondents than the other two panels, $F(2,704) = 61.71$, $p < .001$. Interestingly, the panel with logo and details ($M = 3.19$) and the panel with the statement on the world market ($M = 3.28$) were both considered relatively new. The analysis revealed no interaction with the order in which the panels were presented, $F(4,704) = .56$, *ns*, but there were interactions with the order of the products, $F(4,704) = 3.10$, $p < .05$, and the combined order of panels and products, $F(8,704) = 2.17$, $p < .05$. Hence, there were some fluctuations in the ratings, which may indicate that the various real products generated their own associations; for instance, fillet of chicken with EKO logo was even more familiar ($M = 2.03$) than the other products but fillet of chicken from the world market was relatively new ($M = 3.61$).

The outcomes of these checks support our strategy to start with a general analysis of the results. About the other checks we can be brief. The ratings of the six food choice criteria showed that they were indeed quite important to most respondents. In order of decreasing importance, they were: "taste" ($M = 4.71$), "safety" ($M = 4.69$), "healthy" ($M = 4.58$), "nature and environmentally friendly production" ($M = 4.23$), "animal friendly production" ($M = 4.06$), and "not too expensive" ($M = 3.71$). The four personal value measures yielded a Cronbach's alpha of .80 (universalism, $M = 4.11$), .64 (security, $M = 4.07$), .76 (power, $M = 2.68$) and .75 (hedonism, $M = 4.02$).

Tests of the hypotheses

Hypotheses 1 and 2 were tested in ANOVAs with the information panels as within-subjects factor and order of presentation as between-subjects factors. Firstly, we performed the analysis with the repeated measures of the beliefs about the product in terms of six food choice criteria. The multivariate analysis showed a significant effect of the information panels $F(12,331) = 55.42$, $p < .001$. The order in which products and information panels were presented yielded no interaction effects, but there was a significant effect of the combined order of products and panels $F(48,1336) = 2.04$, $p < .001$. The univariate tests showed that the information panels had an effect on each of the food choice criteria; Table 2 displays the effect sizes found in the overall analysis and in the test of within-subjects contrasts. The latter appear to support hypothesis 1 (*contrast* 1) and hypothesis 2 (*contrast* 2). In comparison with the product attributed to the world market, the product with the logo was considered more animal friendly ($\eta^2 = .321$), better for nature and environment ($\eta^2 = .268$), more expensive ($\eta^2 = .228$), safer ($\eta^2 = .151$), healthier ($\eta^2 = .124$) and tastier ($\eta^2 = .070$). Further, in comparison with the product with just the logo, the product with logo and details was rated more animal friendly ($\eta^2 = .233$), better for nature and environment ($\eta^2 = .147$), healthier ($\eta^2 = .117$), more expensive ($\eta^2 = .091$), safer ($\eta^2 = .069$) and tastier ($\eta^2 = .069$).

Table 2
Effects of the information panels on product beliefs and purchase intentions

	Effect size (partial η^2)		
	All the information panels	Contrast 1: world market–logo	Contrast 2: logo–logo with details
Product belief			
Tastier	.123***	.070***	.069***
Safer	.200***	.151***	.069***
Healthier	.215***	.124***	.117***
Better for nature and the environment	.348***	.268***	.147***
More animal friendly	.446***	.321***	.233***
More expensive	.286***	.228***	.091***
Purchase intention			
If you want something easy	.002	.004	.001
If you want something sensible	.078***	.069***	.015*
If you want something tasteful	.019**	.015*	.006

* $p < .05$; ** $p < .01$; *** $p < .001$.

In the second analysis, we used the three purchase intentions—focused on something easy, something sensible or something tasty—as repeated measures. Again the multivariate analysis showed a significant effect of the information panels $F(6,345) = 15.37$, $p < .001$. In addition, there were interaction effects due to the order of the panels, $F(12,692) = 2.33$, $p < .01$, and the combined order of products and panels $F(24,1392) = 3.66$, $p < .001$. The univariate tests revealed that the information panels had an effect on purchase intentions in two of the three cases; the effect sizes we found in the overall analysis and in the test of within-subjects contrasts are displayed in Table 2. It appeared that the information panels did not have any effect on consumers who wanted to buy something easy ($\eta^2 = .002$). If they wanted to buy something tasty, the logo had a small positive effect in comparison to the product from the world market (contrast 1, $\eta^2 = .015$). The impact of the logo was more pronounced if they wanted to buy something sensible (contrast 1, $\eta^2 = .069$); in this case their intention to buy the product with logo and details was also a bit stronger (contrast 2, $\eta^2 = .015$).

Hypothesis 3 stated that adding the detailed information enables consumers to choose a product that is more in agreement with their personal values. We tested the hypothesis by including the four value scales as covariates in the analysis. The interaction between the impacts of the information panels and the covariates was significant in three of the four cases (universalism $F(6,340) = 2.66$, $p < .05$; security $F(6,340) = 2.20$, $p < .05$; power, $F(6,340) = 1.22$, ns; hedonism $F(6,340) = 3.19$, $p < .01$). Instead of the B coefficients of the covariates we present in Table 3 the correlations between value scales and purchase intentions for each of the information panels. Purchase intentions regarding a product from the world market were not correlated with personal values. In contrast, there were small significant correlations between personal values and purchase intentions about products presented with logo

Table 3
Partial^a correlations between personal values and purchase intentions for each information panel

Personal values	Information panel		
	World market	Logo	Logo with details
Universalism	-.008	.031	.165**
Security	-.020	-.113*	-.181***
Power	-.041	.110*	-.060
Hedonism	.077	-.043	.100

* $p < .05$; ** $p < .01$; *** $p < .001$.

^aThe mean rating of each respondent to all of the value items was used as a variable on which other correlations were partialled (e.g., Schwartz et al., 2001).

and details. This result appears to confirm that endorsing universalistic values is correlated with preferences for organic products. Interestingly, purchase intentions for organic products were lower among those participants who emphasized security values. This may indicate that they did not completely trust this type of products.

To sum up, the overall pattern of the results indicates that the information panels had a moderate impact on the beliefs about the product and a small impact on the purchase intentions. Although the three hypotheses were supported, the interaction effects indicate that the overall pattern is not completely representative for each combination of product and information panel. As an extra check, we used the non-parametric Friedman's test for related samples and the Wilcoxon signed-rank test for paired comparisons. These analyses confirmed that the purchase intentions were significantly different among the three panels ($n = 364$; $\chi^2 = 27.89$, $p < .000$), especially between "world market" and "logo" ($z = 3.51$; $p < .000$; one-sided) and less so between "logo" and "logo with details" ($z = 1.84$; $p < .05$; one-sided).

Further analysis

To zoom in on the features of the various combinations of products and information panels we performed some further analyses. Although our design does not guarantee that we can reliably distinguish between meaningful and random deviations, it is worthwhile to present an overview of the ratings for each combination of product and information panel. Table 4 displays how each product was rated in comparison to similar products; for reasons of presentation we scaled the ratings of the food choice criteria from 2 (better than similar products) to -2 (worse than similar products). The results demonstrate that there were indeed some variations on the overall pattern. For instance, fillet of chicken seems to have made a rather negative impression if the product was attributed to the world market (four times $M < -1$), but a quite positive impression if the product was presented with an EKO logo and a list of animal welfare standards (two times $M > 1.40$). Interestingly, fillet of salmon was not rated very favourably if it was presented with just the EKO logo; the meaning of the logo may not have been very salient in case of this product.

Again, Table 4 demonstrates that the difference between the panel with just the logo and the panel with logo and details involved more items than just the issue of animal

Table 4
Mean ratings^{1,2} of product beliefs per product and information panel

Product	Information panel		
	World market	Logo	Logo with details
Fillet of chicken			
Tastier	-1.19 ^a	-.23 ^b	.45 ^c
Safer	-1.11 ^a	.16 ^b	.31 ^c
Healthier	-1.11 ^a	.21 ^b	.71 ^c
Better for nature	-.98 ^a	.63 ^b	1.07 ^c
More animal friendly	-1.13 ^a	.87 ^b	1.46 ^c
More expensive	-.50 ^a	1.18 ^b	1.42 ^b
Semi-skimmed milk			
Tastier	-.66	-.40 ^a	-.26 ^a
Safer	-.63 ^a	-.27 ^{ab}	.16 ^b
Healthier	-.73 ^a	-.08 ^b	.29 ^b
Better for nature	-.62 ^a	.34 ^b	1.02 ^c
More animal friendly	-.80 ^a	.41 ^b	1.16 ^c
More expensive	-.26 ^a	.74 ^b	1.26 ^c
Fillet of salmon			
Tastier	-.70 ^a	-.52 ^a	-.07 ^b
Safer	-.78 ^a	-.27 ^b	.47 ^c
Healthier	-.61 ^a	-.46 ^a	.46 ^b
Better for nature	-.73 ^a	.02 ^b	.92 ^c
More animal friendly	-.75 ^a	-.24 ^b	1.02 ^c
More expensive	.07 ^a	.60 ^b	1.25 ^c

¹Scaled from 2 (better than similar products) to -2 (worse than similar products).

²Means with different subscript differ significantly (Bonferroni $*p < .05$).

welfare itself. With the exception of taste, safety and health scores for milk and the price of chicken, the “logo with details” panel was attributed higher scores than the “mere logo” panel on each belief. Across all three products, the belief scores that seemed most affected were “more animal friendly” and “better for nature and environment” as well as “more expensive”. Obviously, the shifts in the belief scores were to a certain extent associated with each other. To shed more light on the product beliefs and their associations with the purchase intentions we performed a multiple regression analysis for each product. In these analyses, the purchase intentions were averaged over the three foci. We used a hierarchical regression first entering the product beliefs and the ratings of their importance and then the combinations of belief and weight to test the interaction. As the interaction step had a significant impact, Table 5 presents only the coefficients of the weighted beliefs, which are psychologically more meaningful than the separate ratings (e.g., Eagly & Chaiken, 1993, p. 235).

The regression coefficients in Table 5 reveal that, on the one hand, “tastier”, “better for nature and environment” (positive signs) and, on the other hand, “more expensive” (negative sign) were the most important predictors of the purchase intentions. The weighted beliefs that the product was “safer” and “healthier” were strongly correlated with each other (higher than .60) and did not add much to the prediction. Also, “more animal friendly” was not a significant predictor; perhaps the rating was too obvious under the present circumstances. The weighted belief that the product was “more animal friendly” strongly correlated (higher than .75) with the weighted belief that it was “better for nature and environment” but the latter showed higher correlations with the purchase intentions. The negative sign of price may have been one of the reasons why the information panels had only small impacts on the purchase intentions.

Table 5
Prediction of product specific purchase intentions by weighted ratings of product beliefs¹ (standardized beta coefficients)

Weighted beliefs	Product		
	Fillet of chicken	Semi-skimmed milk	Fillet of salmon
Tastier	.316***	.267***	.209***
Safer	.208**	.133	.050
Healthier	-.147	.049	.071
Better for nature and the environment	.393***	.190*	.231**
More animal friendly	-.088	-.115	.087
More expensive	-.150**	-.193***	-.100*
R^2	.313	.204	.264

* $p < .05$; ** $p < .01$; *** $p < .001$.

¹The ratings were multiplied by the importance of each food choice criterion.

The analysis presented in Table 5 is a final check on the types of inferences that consumers made. The point is that perceived prices of the organic products were not only higher (Tables 2 and 4) but also negatively related to the purchase intentions (Table 5). This implies a more deliberated mode of operation than a passive acceptance of the information panels, resulting in impulse buying or rejecting. The differences in sign and size between the coefficients do not indicate that the sheer number of sentences presented by the panel with logo and details has worked as a heuristic cue or that the results are only a reflection of the set-size effect. Although we cannot rule out that some consumers responded just at the peripheral/heuristic level, most of them must also have used central/systematic processes in striking a balance between perceived qualities and prices. The pattern of coefficients does not change very much if the products that were attributed to the world market are left out of the analysis. This label may have surprised consumers, but it did not simply confuse them. Another interesting finding was that the multiple correlations between the product beliefs and the purchase intentions were higher in the case of chicken ($R^2 = .313$) than in the cases of fish ($R^2 = .264$) and especially semi-skimmed milk ($R^2 = .204$). This is in agreement with the suggestion mentioned above that the participants were more impressed by the different information panels regarding chicken than by the other combinations of products and panels. Buying semi-skimmed milk may be associated with habits that are not so easily affected by the information and the motivational foci that we used.

Discussion

The results of our experiment are based on combinations of realistic circumstances and ways in which consumers go beyond the information given. How they recognized, understood and valued the on-package information can be summarized as follows. The organic logo was highly familiar to consumers and it generated profiles of perceived product attributes that were quite favourable for the organic products in comparison with the products without a logo. However, the logo was not completely understood; it appeared that the panel with logo and details had still more effect on consumers' beliefs about the products. The product with logo and details was not only rated as more animal friendly, but also as better for nature and environment, and as healthier than the one with just the logo. The product with logo and details was also considered more expensive, although the prices were in fact similar. Because the participants were never in the position to compare the prices directly, their own associations and inferences must have shaped their ratings, in particular inferences on positive correlations between quality and price (e.g., Kardes et al., 2004).

These results support our first and second hypothesis. It appeared that the logo did not play the role of a well-understood shopping aid, as consumers tended to under-

estimate its distinctive value. In contrast, detailed on-package information about animal welfare standards led to overgeneralizations based on associations between animal welfare, environmental issues, safety and expected prices. As a result, consumers tended to overestimate the premium price of the corresponding products. This type of behaviour can occur because current food production standards are not transparent and consumers are not well informed about conventional and organic farming. One of the crucial points may be that consumers seriously underestimate how much effort producers make to meet the organic production standards, including the animal welfare standards that are considered valuable by many people. It is difficult for producers to communicate the nature of their production standards and the rationale for a premium price in the context of a supermarket that sells both conventional and organic products. These circumstances may account for the current situation in the Netherlands, which we characterized above in terms of high familiarity and low sales.

More transparency in matters of food can be advantageous to consumers individually and to society at large, as it affects price-value trade-offs. Consistent with our third hypothesis, we found that the panel with logo and details enabled consumers to choose more in agreement with their personal values than the other conditions. That is, those who endorsed universalistic values had a higher intention to buy the explicitly animal friendly product and those who particularly endorsed safety had a lower intention to buy it. The former finding is in agreement with the literature (Grunert & Juhl, 1995; Hoogland et al., 2005; Thøgersen & Ölander, 2002), but the latter finding is new to our knowledge. The explanation may be that those consumers who are very concerned with their personal health and safety—i.e., value priorities that belong to the “conservation” part of Schwartz' value circle—do not completely trust organic production standards, which may be relative new to them. Obviously, more research is necessary to assess the robustness of this result and its background.

More transparency of production standards can also be advantageous to society at large. Policy-makers in government and industry who want to use on-package information as an instrument to foster a more sustainable food system for society can find several clues in our results. One important lesson is that an information panel will not uniformly elicit changes in beliefs and purchase intentions among consumers with divergent value priorities, especially if there are also interfering beliefs about higher prices. Moreover, outside the context of an experiment consumers have less time to read and interpret the information and may rely even more on associations. Just because consumers do not pay attention to the label most of the time, those scarce moments that they do read it can be extremely important. The latter can only contribute to more sustainable food choices if the information helps them to make sense of the issue immediately. This puts high demands on the presentation of the information, for

example, by carefully designing front and back package labels (Wansink, 2003), and on more general forms of transparency that can support the role of on-package information as a proper shopping aid, such as information campaigns organized by government, business or civil society.

An intriguing result from our work is the impact of the panel that made an explicit link between a food and the world market. This on-package information appeared to be relatively new to many participants. From a methodological point of view, this effect can be seen as a flaw in our design. We may have been too obtrusive in the way we drew attention to the notion of food that seems to come from nowhere in particular. It is unlikely, however, that this affected the differences we found between the two panels with information on organic products. Nevertheless, making consumers aware of the role played by the world market is also a relevant aspect of transparency and it may need more attention in the future. The current response of consumers in the Netherlands was mixed: the product from the world market was rated less positively than the others in terms of perceived qualities but also less expensive.

Although we are confident about the robustness of our main results regarding organic meat and fish, we must emphasise that the outcomes' overall pattern is not completely representative for each combination of product and information panel. The realistic elements of our design may have created several singularities and we were unable to control the processing of information with regard to timing and content. Using real products opened the possibility that some typical associations between products and information panels have influenced our results. Further, the design does not allow us to disentangle the specific effects of the sheer amount of information, the time spent in contemplating the information, and the content of the information presented by the panel with logo and details.

An important limitation of our work is that we were not able to track consumers' peripheral/heuristic and central/systematic modes of operation. It should be mentioned that most behaviours are a joint function of both information processing systems (Strack & Deutsch, 2004) and that more research is necessary into the conditions under which the central/systematic processes of "system 2" correct or override the peripheral/heuristic processes of "system 1" (Kahneman, 2003). What we can claim based on the present study is that many consumers must have used a deliberate mode of operation, as their purchase intentions reflect the metacognition of a balance between perceived price and quality. However, this metacognition may have come at the end of the process, after a processing stage dominated by a peripheral/heuristic mode of operation. Moreover, we have no details about the processing modes of the whole group and it is possible that some consumers have developed a positive purchase intention based on peripheral/heuristic associations and affect, without further deliberation. Yet, this does not invalidate the main

conclusions. If consumers had fully understood the meaning of the organic logo before the experiment, they would not have responded to the additional details. After seeing the details, they may still not have fully understood its meaning, but they were in a better position to choose in line with their values.

Another methodological issue is that all participants were recruited in the context of an urban supermarket. Thus, the results cannot be generalized to consumers who use other outlets, such as speciality shops. Some dedicated fish consumers, for instance, may prefer unpackaged fish. Despite these potential drawbacks, we believe that our results offer important clues to researchers as well as policy makers in government and industry.

Acknowledgements

This paper is based on work for (1) the multidisciplinary Verantwoorde Voeding (sustainable and healthy food) programme funded by ZonMw (Grant no. 014-12-002), and (2) the multidisciplinary PROFETAS (PROtein Foods, Environment, Technology and Society) programme, funded by the Netherlands Organization for Scientific Research NWO (Grant no. 455.10.300). We are particularly grateful to the editor and the anonymous reviewers for their recommendations. Also, we owe a special debt of gratitude to the designers Mark van der Werff and Carsten Clarijs; without their selfless endeavour the stimuli would not have had such outstanding graphic quality.

References

- Aarset, B., Beckmann, S., Bigne, E., Beveridge, M., Bjorndal, T., Bunting, J., et al. (2004). The European consumers' understanding and perceptions of the "organic" food regime: The case of aquaculture. *British Food Journal*, 106, 93–105.
- Andrews, J. C., Netemeyer, R. G., & Burton, S. (1998). Consumer generalization of nutrient content claims in advertising. *Journal of Marketing*, 62, 62–75.
- Biologica. (2005). *EKO monitor, cijfers en trends, jaarrapport 2004 (Annual monitor of the organic sector in the Netherlands)*. Utrecht: Biologica, available at <www.biologica.nl>.
- Caswell, J. A. (1997). *Uses of food labelling regulations*. Paris: Organisation for Economic Co-operation and Development, Directorate for Food, Agriculture and Fisheries, OCDE/GD(97)150.
- Chernev, A., & Carpenter, G. S. (2001). The role of market efficiency intuitions in consumer choice: A case of compensatory inferences. *Journal of Marketing Research*, 38, 349–361.
- Conner, D. S. (2004). Expressing values in agricultural markets: An economic policy perspective. *Agriculture and Human Values*, 21, 27–35.
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace Javanovich.
- European Commission. (2004). *European Union citizens and agriculture from 1995 to 2003*. Brussels: European Commission, Special Eurobarometer—European Opinion Research Group EEIG.
- European Commission. (2005). *Attitudes of consumers towards the welfare of farmed animals*. Brussels: European Commission, Special Eurobarometer 229/Wave 63.2—TNS Opinion & Social.
- Fischler, C. (1980). Food habits, social change and the nature/culture dilemma. *Social Science Information*, 19, 937–953.

- Grunert, S. C., & Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. *Journal of Economic Psychology*, *16*, 39–62.
- Heller, M. C., & Keoleian, G. A. (2003). Assessing the sustainability of the US food system: A life cycle perspective. *Agricultural Systems*, *76*, 1007–1041.
- Higginson, C. S., Kirk, T. R., Rayner, M. J., & Draper, S. (2002). How do consumers use nutrition label information? *Nutrition and Food Science*, *32*, 145–152.
- Homer, P. M., & Kahle, L. R. (1988). A structural equation test of the value–attitude–behavior hierarchy. *Journal of Personality and Social Psychology*, *54*, 638–646.
- Hoogland, C. T., de Boer, J., & Boersema, J. J. (2005). Transparency of the meat chain in the light of food culture and history. *Appetite*, *45*, 15–23.
- Juric, B., & Worsley, A. (1998). Consumers' attitudes towards imported food products. *Food Quality and Preference*, *9*, 431–441.
- Kahneman, D. (2003). A perspective on judgment and choice—Mapping bounded rationality. *American Psychologist*, *58*, 697–720.
- Kardes, F. R., Posavac, S. S., & Cronley, M. L. (2004). Consumer inference: A review of processes, bases, and judgment contexts. *Journal of Consumer Psychology*, *14*, 230–256.
- Klintman, M., & Boström, M. (2004). Framings of science and ideology: Organic food labelling in the US and Sweden. *Environmental Politics*, *13*, 612–634.
- Magnusson, M. K., Arvola, A., Koivisto Hursti, U.-K., Åberg, L., & Sjöden, P. O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, *40*, 109–117.
- Nestle, M. (2002). *Food politics: How the food industry influences nutrition and health*. Berkeley, CA: University of California Press.
- Nygård, B., & Storstad, O. (1998). De-globalization of food markets? Consumer perceptions of safe food: The case of Norway. *Sociologia Ruralis*, *38*, 35–53.
- OECD. (2001). *OECD Environmental strategy for the first decade of the 21st century*. Paris: Organisation for Economic Co-operation and Development, Environment Directorate.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, Vol. 19 (pp. 123–205). New York: Academic Press.
- Pretty, J. N., Ball, A. S., Lang, T., & Morison, J. I. L. (2005). Farm costs and food miles: An assessment of the full cost of the UK weekly food basket. *Food Policy*, *30*, 1–19.
- Schifferstein, H. N. J., & Oude Kamphuis, P. A. M. (1998). Health-related determinants of organic food consumption in the Netherlands. *Food Quality and Preference*, *9*, 119–133.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 1–65). San Diego, CA: Academic Press.
- Schwartz, S. H., Melech, G., Lehmann, A., Burgess, S., Harris, M., & Owens, V. (2001). Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. *Journal of Cross-Cultural Psychology*, *32*, 519–542.
- Smil, V. (2002). Worldwide transformation of diets, burdens of meat production and opportunities for novel food proteins. *Enzyme and Microbial Technology*, *30*, 305–311.
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, *8*, 220–247.
- Tanner, C., Kaiser, F. G., & Wolfing Kast, S. (2004). Contextual conditions of ecological consumerism—A food-purchasing survey. *Environment and Behavior*, *36*, 94–111.
- Tansey, G., & Worsley, T. (1995). *The food system: A guide*. London, UK: Earthscan.
- Thøgersen, J., & Ölander, F. (2002). Human values and the emergence of a sustainable consumption pattern: A panel study. *Journal of Economic Psychology*, *23*, 605–630.
- Verbeke, W., Ward, R. W., & Avermaete, T. (2002). Evaluation of publicity measures relating to the EU beef labelling system in Belgium. *Food Policy*, *27*, 339–353.
- Vogel, D. (2003). The hare and the tortoise revisited: The new politics of consumer and environmental regulation in Europe. *British Journal of Political Science*, *33*, 557–580.
- Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? *Journal of Consumer Affairs*, *37*, 305–316.
- Wessells, C. R., Johnston, R. J., & Donath, H. (1999). Assessing consumer preferences for ecolabeled seafood: The influence of species, certifier, and household attributes. *American Journal of Agricultural Economics*, *81*, 1084–1089.
- Wier, M., & Calverley, C. (2002). Market potential for organic foods in Europe. *British Food Journal*, *104*, 45–62.