



Consumer evaluation of fish quality as basis for fish market segmentation

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Received 18 April 2005; received in revised form 1 July 2006; accepted 15 September 2006

Available online 13 November 2006

Abstract

This paper focuses on consumer evaluation of fish quality and its association with fish consumption, risk and benefit beliefs and information processing variables. Cross-sectional data were collected from a sample of 429 consumers in March 2003 in Belgium. Two dimensions shape fish quality evaluation: personal relevance attached to fish quality and self-confidence in fish quality evaluation, which allow segmenting the market in four fish consumer segments. The segments are typified as Uninvolved, Uncertain, Self-confident and Connoisseurs, and have distinctive behavioural, attitudinal and socio-demographic profiles. The Uninvolved are mainly young males, have the lowest fish consumption level, weakest belief in health benefits from eating fish, and lowest interest in both search and credence information cues. Uncertain fish consumers are mainly females, with a tendency of lower education and urban residence, who feel not confident to evaluate fish quality, although they find quality very important. They display a strong interest in a fish quality label. The most relevant findings about Self-confident consumers, whose socio-demographic profile matches best with the overall sample, are their high fish consumption level, and their relatively low interest in a fish quality label. Connoisseurs are mainly females in the age category 55+, who are strongly involved with food in general and most convinced of the association between food and health. They have the highest fish consumption and show a strong interest in both search and credence cues, as well as in a fish quality label. The segments do not differ with respect to risk perception about fish.

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Keywords: Consumer; Fish; Information; Involvement; Perception; Quality; Segmentation

1. Introduction

During the last decades healthy eating habits have received increased attention, and it is widely recognised that regular fish consumption is one possible health improving practice (Hoge Gezondheidsraad, 2004; Sidhu, 2003). However, actual fish consumption generally not even comes close to the recommendations to eat fish twice a week in many European countries (Scientific Advisory Committee on Nutrition, 2004; Welch et al., 2002).

A considerable amount of research has shed light on consumers' motives and barriers to fish consumption. Research has especially focused on the relationship between consumption of fish/seafood and attitudes (Brunso, 2003; Leek, Maddock, & Foxall, 2000; Letarte, Dubé, & Troche, 1997; Olsen, 2001; Olsen, 2003), and the impact of consumer involvement (Juhl & Poulsen, 2000; Olsen, 2001; Olsen, 2003), role of lifestyles (Myrland, Trondsen, Johnston, & Lund, 2000), experience and habit (Myrland et al., 2000; Trondsen, Braaten, Lund, & Eggen, 2004; Trondsen, Scholderer, Lund, & Eggen, 2003; Honkanen, Olsen, & Verplanken, 2005), socio-demographic characteristics (Myrland et al., 2000; Olsen, 2003; Trondsen et al., 2003; Trondsen et al., 2004; Verbeke & Vackier,

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2005), health and diet beliefs (Trondsen et al., 2003; Trondsen et al., 2004; Verbeke et al., 2005), and convenience (Olsen, 2003). In contrast, relatively few studies have focused on consumers' fish quality perception and quality evaluation, with a few exceptions. In one study by Nielsen, Sørensen, and Grunert (1997), a qualitative approach was applied to derive quality dimensions of importance to consumers, revealing that desired quality dimensions are especially linked to health and family well-being, thus relating to the personal relevance of fish quality. In another study on consumers' quality evaluation, it was found that many consumers feel unable to use attributes of fresh fish to evaluate the overall expected quality (Juhl & Poulsen, 2000). Also consumer interest for additional information and use of information sources has only scarcely been researched with respect to fish (Pieniak, Verbeke, Fruensgard, Brunsø, & Olsen, 2004).

The present paper aims at bridging part of this gap in understanding consumers' quality evaluations of fish, through focusing on two specific areas of consumer evaluation of fish quality and their associations with consumer behaviour towards fish. Since many studies already concentrated on the precursors of quality and quality perceptions, we do not intend to focus on what fish quality means to specific people in this study. Instead, we will argue that personal importance attached to fish quality, and consumers' self-confidence to assess fish quality, are two relevant concepts in the quality evaluation process. It is argued that these two dimensions influence several steps in the decision-making process of fish consumption, and are associated with individual and socio-demographic factors. The following section introduces the constructs and the relations that will be investigated in this study. Next, materials and methods are detailed, followed by the presentation and discussion of the empirical results.

2. Theoretical approach to study consumer evaluation of fish quality

2.1. Dimensions in quality evaluation

First, consumers may differ with respect to quality consciousness, or personal relevance attached to quality. Quality consciousness or relevance is defined as "a mental predisposition to respond in a consistent way to quality-related aspects which is organised through learning and which influences behaviour" (Steenkamp, 1989). Consumers who are more concerned with product quality are likely to have a higher utility, i.e. a higher valuation, for quality products than consumers who are unconcerned about quality. The concept of subjective sense of concern towards an object, or importance or personal relevance is closely related to involvement (Zaichkowsky, 1985), which is also defined as a motivational state of mind with regard to an object or activity (Mittal & Lee, 1989). In this sense, higher involvement or personal relevance attached to quality, may impact on quality evaluation and its outcomes in terms of

decision-making. As a result, involvement with quality, which refers to importance attached to quality or quality consciousness is the first hypothesised dimension of fish quality evaluation.

Second, consumers often experience quality uncertainty because quality performance, including the taste sensation and quality experience after cooking and consumption, is difficult to predict based on product characteristics available in the purchasing situation (Grunert, 1997). Consumers face difficulties in evaluating quality, in particular for unbranded and highly perishable food products like fresh fish (Juhl & Poulsen, 2000). Furthermore, consumers differ in their perceptual abilities, cognitive capacities, personal preferences, and experience level, and therefore, their evaluation and perception of quality may vary accordingly (Ophuis & Van Trijp, 1995). In response to uncertainty and limited abilities, they form quality expectations through making inferences by using cues or pieces of information. One of the basic drivers of inference-making pertains to confidence in cue utilisation (Cox, 1962), or also confidence in the personal ability to make inferences based on particular cues (Grunert, 2005a). Hence, self-confidence in making an evaluation of fish quality is hypothesised to constitute a second dimension in fish quality evaluation.

Individual differences in quality evaluations have numerous consequences, e.g. in terms of behaviour, beliefs or attitudes, and search for and use of information sources during decision-making, since expected quality influences a whole range of attitudes and behaviours from meal preparation methods to future purchase decisions (Brunso, Fjord, & Grunert, 2002; Grunert, Hartvig Larsen, Madsen, & Baadsgaard, 1996).

2.2. Association with behaviour and beliefs

Consumers who lack the confidence in assessing fish quality – because of for example, limited experience or low perceptual ability – are expected to act differently during the decision-making process compared to knowledgeable, self-confident consumers. Both product expertise (i.e. the ability to perform product-related tasks successfully) and product familiarity (i.e. the number of product-related experiences) are hypothesised to associate with consumers' confidence in assessing product quality, as well as with involvement with quality. We expect that consumers who have limited confidence in assessing fish quality (i.e. consumers facing higher levels of uncertainty) and/or lower involvement with fish quality, will be less familiar with fish and less inclined to buy fish.

Lower experience and lower confidence are likely to associate also with the perceived risk of buying low quality or making a wrong choice when buying fish, as well as with fish benefit perception. Hence, also higher risk perception and a more critical attitude towards health benefits can be expected among consumers who are less involved and feel less confident about evaluating fish quality. Thus, a consumer who feels more confident in judging fish quality,

can display a more favourable attitude and a higher fish consumption pattern as s/he is relatively sure of buying high quality, hence, at least the potential barrier of quality uncertainty is lifted.

2.3. Association with information variables

Consumers who find quality very important, or who are highly involved with quality, and/or feel more confident in evaluating quality, may handle information differently as compared to consumers who are more casual towards quality.

First, previous research has also demonstrated that prior product knowledge or familiarity with the product influences the extent to which consumers search for, recall and use information in judgements of product quality and in product choice (e.g. Bettman, Luce, & Payne, 1998; Howard & Sheth, 1969; Rao & Monroe, 1988). Increased familiarity leads to better-developed knowledge structures or associative networks about a product that trigger the use of specific evaluative criteria and rules for product assessments. Consequently, depending on familiarity with the product (and hence having more or less confidence), consumers differed in their use of information in product evaluation in general (Park & Lessig, 1981). Specifically, both the type of information cues used, and the number and relative importance attached to information sources differed by the level of product-specific buying experience (Kline & Wagner, 1994). As self-confidence in quality evaluation is expected to be associated with consumers' product expertise, we expect that the level of self-confidence will also influence the use of information sources and information cues.

Second, a multitude of research has focussed on the relationship between searched or used information cues and expected or experienced quality. Brand name and price are often considered as indications of product quality (Boulding & Kirmani, 1993; Dodds, Monroe, & Grewal, 1991). Previous research concluded that the use of specific quality cues associates with product experience (Bredahl, 2003; Rao & Monroe, 1988), product interest or knowledge (Sawyer, Worthing, & Sendak, 1979; Zeithaml, 1988) and perceived decision difficulty (Lambert, 1972; Pechmann & Ratneshwar, 1992; Sawyer et al., 1979; Zeithaml, 1988). In other words, consumers who find it hard to evaluate, for example, product quality, are likely to use different attributes to base their purchase decision on compared to consumers who can easily assess product quality. As indicated before, whether a consumer will use a quality cue depends on the predictive value of the cue and the confidence the consumer has in his/her ability to comprehend the cue correctly (Cox, 1962; Steenkamp, 1990). Different cues emerge when personal ability (and hence self-confidence) to judge product quality differs. Especially when consumers cannot judge quality, brand names frequently emerge as an important evaluative criterion or as a surrogate indicator of quality (Boulding & Kirmani, 1993).

An individual who does not attach great importance to quality, may base his/her decision on attributes like price, expiry date and convenience (preparation) and may use less information cues, while the appearance of the fish, control certificate or the possible presence of harmful ingredients (intrinsic/credence attributes) can be more important to the consumers perceiving quality and their ability to evaluate quality as important. Furthermore, consumers who feel less confident in rating fish quality can be more prone to use control certificates or use familiar, knowledgeable or trustworthy sources (e.g. friends, family, fish monger) as compared to the more self-confident consumer. In the specific case of fresh fish, a relevant question pertains to the potential of quality labels as an information cue, and whether quality labels could perform a function similar to brands, i.e. alleviating low self-confidence.

2.4. Association with demographics, individual's food involvement and food-health awareness

Finally, we propose that the two hypothesised components of quality evaluation – involvement with quality and self-confidence in quality assessment – are associated with individual characteristics, such as socio-demographics, cognitive and motivational variables. Previous research indicated that personal attribute importance – resulting from its instrumentality – is amongst others related to a consumer's socio-demographic profile, knowledge and involvement (Engel, Blackwell, & Miniard, 1995). Consequently, consumers who attach different importance to quality in a food context could also differ in their individual characteristics. Relevant individual characteristics are for instance socio-demographic characteristics, as well as individual's involvement with food in general, and individual's awareness of the relationship between food and health, which are quite relevant in the specific case of fish that has a predominantly healthy image (Nielsen et al., 1997). Also a consumer's self-confidence in evaluating quality can be related to individual characteristics. Specifically, product expertise and familiarity have been demonstrated to be related to individual differences in socio-demographic profile, involvement (Celsi & Olson, 1988) and product-specific knowledge (Park & Lessig, 1981).

2.5. Research objectives

Through this research, we first aim at validating the two hypothesised dimensions in relation to fish quality evaluation, i.e. involvement with fish quality and self-confidence during product evaluation. Second, we aim at segmenting consumers based on their fish quality evaluation profile and to analyse individual differences that determine or explain consumer decision-making in general and information search regarding fish in particular. The rationale for starting from quality evaluation-based segmentation is that the hypothesised quality dimensions can potentially be altered through appropriate communication. **Brunso**

et al. (2002) already stressed that grouping consumers into segments with similar characteristics can provide a better understanding of consumption patterns. Furthermore, segmentation followed by targeted information provision has been suggested to be a valuable route for reducing uncertainty at the consumer level, and effectively changing consumer behaviour (Verbeke, 2005; Kornelis, De Jonge, Frewer, & Dagevos, 2006). The following section presents the procedures followed in order to meet these objectives.

3. Materials and methods

3.1. Sample and procedure

Survey data were collected through questionnaires during March 2003 in Belgium. A quota sampling procedure with age as main quota control characteristic was applied. Respondents were either selected through a door-by-door random walk procedure or at supermarkets. All respondents were responsible for food purchasing within their household. They were checked against the age quota and asked for their participation in the survey. The questionnaire was fully self-administered.

The total sample consisted of 429 respondents, 284 women and 145 men. It is important to note that the non-probability sampling method and respondent selection procedures do not yield a statistically representative sample, hence not allowing generalisations to the overall population. Nevertheless, with the characteristics as presented in Table 1, the sample covers a wide range of consumers in terms of socio-demographics. With respect to age, a small over-sampling of younger respondents (<25 years) occurred. The age of the respondents ranged from 29 to 83 years, with a mean of 40.6 (SD = 15.0). The presence of children in the household closely matches

the distribution in the population. The average family size in the sample (2.9 persons per family) is somewhat higher in comparison with the population (2.4 persons per family) (NIS, 2002).

3.2. Measurement of constructs

First, eight items pertaining to fish quality evaluation were presented and scored on five-point interval scales ranging from “totally disagree” to “totally agree”. Four items pertained to the perceived importance of fish quality and making a good decision when evaluating fish quality, whereas the other four items pertained to the self in relation to fish quality evaluation, i.e. the perceived difficulty or uncertainty in making fish quality evaluations.

Second, total fish consumption and consumption of fresh and processed (dried, salted or smoked) fish were measured on a seven-point frequency scale ranging from “daily” to “never”. In addition, we asked our respondents how many times (out of ten) fish is chosen when visiting a restaurant. Furthermore, we confronted our respondents with 10 fish species and asked if they ever consumed these (yes/no). The choice of species was based on consumer panel data for fish consumption in Belgium (GfK, 2003), with cod, salmon, and tuna being considered as commonly known and frequently consumed fish species; herring, mackerel, and sardines as processed fish species, which are usually canned or marinated; and sole, turbot, brill and angler as more exclusive fish species that are more expensive and/or require specific cooking skills. The latter species are consumed less frequently at home, while more often on special occasions or in restaurants.

Third, consumer beliefs in potential health benefits and risks from consuming fish were assessed on five-point Likert scales. Three groups of scientific evidence-based health benefits were included. Based on the evidence that fish contains vitamin D, which is essential for bone mineralisation, the statements that regular fish consumption improves bone development and makes people strong were included. Three statements were included based on fish's content of omega-3 fatty acids, and its potential beneficial role in the prevention of coronary heart disease and certain cancers. Finally, given the presence of DHA in fish, and its potential role in brain development, consumers' beliefs in the statements that eating fish stimulates brain development and makes people smart were measured. Similarly, consumers' risk beliefs were assessed as the beliefs that fish contains PCBs and dioxins, pesticide and other residues, heavy metals, veterinary drug residues, and colorants as potential harmful substances.

Fourth, respondents were asked to indicate (yes/no) which information sources they use to gain knowledge about fish. Potential sources of fish information included were mass media (television, radio, newspaper, magazines), personal sources (friends and family, fish dealer), marketing or commercial sources (retailers, commercial advertising) and government. Also consumers' use of 11 on-pack

Table 1
Socio-demographic characteristics of the sample (% of respondents, $n = 429$)

		<i>Children <18 in the family</i>	
<i>Gender</i>		Yes	26.4
Male	33.1	No	73.6
Female	66.9		
		<i>Income class (per month)</i>	
<i>Age</i>		≤850 €	5.9
≤25 years	21.9	850–1,700 €	25.6
26 to 35 years	17.5	1700–2550 €	36.4
36 to 45 years	22.9	>2550 €	32.1
46 to 55 years	22.9		
> 55 years	14.9		
Mean (S.D.)	40.6 (15.0)	<i>Education</i>	
		≤18 years	32.6
		>18 years	67.4
		<i>Region</i>	
<i>Family size</i>		West-Flanders	24.2
1 or 2 persons	48.5	East-Flanders	19.7
3 or 4 persons	38.0	Antwerp	56.1
5 or more persons	11.9		

or on-label information cues for fish was assessed on a five-point scale ranging from “do not use at all” until “use very much”. Finally, consumer interest in a fish quality label was measured on a five-point Likert scale using the item “I would be interested to see a quality label on fish products”.

Fifth, general involvement with food was measured using the 12-item scale proposed by Bell and Marshall (2003). The four-item food-health awareness scale previously used by Ragaert, Verbeke, Devlieghere, and Debevere (2004) and Verbeke et al. (2005) was applied to measure consumer awareness of the relation between personal food habits and health status. The questionnaire finally included a number of socio-demographic variables like age, gender, education, presence of children in the household and living environment.

3.3. Analyses procedures

Data were analysed using SPSS 12.0. First, three exploratory factor analyses were performed independently to discover the basic structure underlying the measures of fish quality evaluation, fish benefit beliefs, and interest in information cues on fish labels. The reliability of the resulting factors was tested by Cronbach's α measure of internal reliability consistency. Next, hierarchical and K-means cluster analysis using the fish quality evaluation factors were performed to obtain consumer segments. Finally, bivariate analyses including cross-tabulation and One-Way ANOVA comparison of means were used to profile the clusters in terms of behaviour, beliefs, use of information sources, interest in information cues, and socio-demographics.

4. Empirical results

4.1. Exploratory factor solutions

First, factor analysis using principal components with the eight items pertaining to fish quality evaluation yielded a two-factor solution, explaining 51.3% of the variance in the original data (Table 2). Factor 1 includes the items that refer to the importance attached to fish quality and the importance of making a good decision or the right choice when choosing fish. This factor corresponds with personal relevance or importance attached to quality, and will further be referred to as “Involvement with fish quality”. The second factor represents an evaluative judgement of fish quality and three items referring to perceived ease or difficulty in personal evaluations of fish quality. Since this factor corresponds with respondents' personal beliefs about quality, and perceived difficulty or confidence in their fish quality assessment ability, it is further referred to as the “Self-confidence in fish quality evaluation”. The reliabilities of the quality importance and self-assessment ability constructs were assessed using Cronbach's α . Both involvement with fish quality ($\alpha = 0.62$) and self-confidence ($\alpha = 0.68$) had sufficient internal reliability consistency.

Table 2

Factor loadings from principal component analysis for evaluation of fish quality

	Factor 1 Involvement with fish quality	Factor 2 Self-confidence to assess fish quality
Quality is important when choosing fish	0.63	
Ease when evaluating fish quality is important	0.68	
Risk of making a bad fish choice is important	0.76	
Making the right decision when choosing fish is important	0.78	
I believe that fish has a good quality		0.54
I find it difficult to judge fish quality ^a		0.59
I never know if I make the right decision when buying fish ^a		0.82
There is a good chance that I make a bad choice ^a		0.80
% Variance explained	26.0	25.3
Cronbach's α internal reliability	0.62	0.68

^a Scores reversed before analysis.

Consequently, respondents' aggregate scores on the two factors were calculated to be used as classification (segmentation) variables in subsequent cluster analysis (see next section).

Second, principal component analysis revealed two benefit belief factors. The first factor pertains to belief in physical health benefits ($\alpha = 0.68$), including benefits with respect to bone development, and cancer and coronary heart disease risk reduction. The second factor includes the items referring to mental health benefits ($\alpha = 0.72$), i.e. brain development (Table 3). Beliefs relating to harmful substances in fish (PCBs, dioxins, residues, heavy metals and colorants) all constituted one factor.

Third, principal component analysis distinguished between interest in credence versus search information cues

Table 3

Factor loadings from principal component analysis for fish benefit beliefs

Eating fish	Factor 1 Physical benefits	Factor 2 Mental benefits
Reduces the risk for heart and coronary disease	0.79	
Reduces the risk to develop cancer	0.78	
Stimulates bone development	0.63	
Makes me stronger	0.62	
Makes me smarter		0.89
Stimulates cerebral development		0.72
Prolongs life		0.60
% Variance explained	31.8	26.1
Cronbach's α internal reliability	0.68	0.72

Table 4
Factor loadings from principal component analysis for interest in information cues on fish labels

	Factor 1 Credence cues	Factor 2 Search cues
Country of origin	0.81	
Captured or farmed	0.81	
Control certificate	0.73	
Dietary composition	0.73	
Eventual harmful substances	0.67	
Health benefits	0.66	
Capture date	0.61	
Price		0.77
Type of fish		0.75
Expiration date		0.62
Weight		0.52
% Variance explained	32.5	17.1
Cronbach's α internal reliability	0.83	0.62

on fish labels (cfr. Darby & Karni, 1973; Nelson, 1970; Nelson, 1974) (Table 4). Search cues are those that the consumer can determine by inspection prior to purchase (Nelson, 1974, p. 730), like price, expiration date and type of fish ($\alpha = 0.62$). Credence cues are qualities that the consumer may not easily or even never assess because of lack of expertise or task difficulty (Grunert, 2005b), like the presence of harmful ingredients, health benefits, capture date, wild versus farmed, control certificate, country of origin and dietary composition ($\alpha = 0.83$).

4.2. Cluster analysis

First, hierarchical clustering was performed with inspection of the agglomeration schedule and dendrogram allowing us to decide that a four cluster solution would be optimal. Next, a K-means cluster analysis using Ward's method was performed with initial cluster centres resulting from the hierarchical procedure. The respective size and scores on the segmentation variables are reported in Table 5, together with a comparison of the clusters in terms of general food involvement and food-health awareness.

Segment 1 (25.2% of the sample) can be typified as Uninvolved fish consumers. These consumers report both the lowest importance attached to fish quality and the low-

est self-confidence in evaluating fish quality. Their low involvement with fish quality fits with their overall lowest food involvement and the lowest awareness of the relationship between food and health.

The second and largest segment (37.1% of the sample) also acknowledges that they have little self-confidence in evaluating fish quality, although they value fish quality rather highly as reflected in their higher score on fish quality importance, therefore being referred to as Uncertain fish consumers. Their general food involvement does not differ from the first segment, but these consumers are somewhat better aware of the relationship between food and health.

Consumers belonging to the third segment (28.5% of the sample) feel quite self-confident in evaluating fish quality, and consider fish quality as important. They are more involved with food in general as compared to the Uninvolved and Uncertain. This segments will be typified as Self-confident fish consumers.

The smallest segment (9.1% of the sample) can be typified as fish Connoisseurs as these consumers feel they are most able to evaluate fish quality and appraise quality also as an extremely important aspect when purchasing fish. These connoisseurs also display the highest general food involvement, as well as the highest awareness of the relationship between food and health.

4.3. Profiling of the clusters

4.3.1. Fish consumption behaviour

Differences relating to fish quality evaluation are clearly reflected in fish consumption behaviour (Table 6). Total claimed fish consumption differs significantly between the segments ($F = 8.25$, $p < 0.001$). Connoisseurs and Self-confident fish consumers show the highest fish consumption frequency (note that 1 denotes "daily", whereas 7 denotes "never"). Uncertain fish consumers mainly eat fish a few times per month, while Uninvolved fish consumers eat fish approximately only once a month. In addition, the four segments display different consumption patterns of fresh fish ($F = 9.24$, $p < 0.001$), though not for processed fish. Especially consumers who claim high self-confidence in evaluating fish quality (Connoisseurs and Self-confident)

Table 5
Profile of consumer segments ($n = 429$) on dimensions of fish quality perception and food involvement

	Segment 1 Uninvolved fish consumers	Segment 2 Uncertain fish consumers	Segment 3 Self-confident fish consumers	Segment 4 Fish Connoisseurs
Segment size (% of sample)	25.2	37.1	28.5	9.1
Involvement with fish quality	3.17a	4.05c	3.65b	4.49d
Self-confidence to assess fish quality	3.02a	3.07a	3.87b	4.11c
Food involvement	3.16a	3.23a	3.36b	3.54c
Food-health awareness	3.51a	3.64b	3.67b	3.89c

Different letters (a–b–c–d) indicate significantly different average scores on five-point scales using ANOVA and LSD post hoc test.

Table 6
Fish consumption behaviour

	Segment 1 Uninvolved	Segment 2 Uncertain	Segment 3 Self- confident	Segment 4 Connoisseurs
<i>Consumption frequency</i>				
Fish total ^a	3.93a	3.56b	3.12c	2.97c
Fresh fish ^a	5.15a	4.84a	4.34b	3.99b
Processed fish ^a	5.84a	5.78a	5.74a	5.69a
Fish in restaurant (on 10 visits)	3.83a	4.61b	5.89c	6.50c
<i>Type of fish^b (% yes)</i>				
Common fish	92.6	85.5	95.9	94.9
Processed fish	44.4	38.4	43.4	43.6
Exclusive fish	13.9	18.9	35.2	38.5

^a Seven-point scale : 1 = every day ; 7 = never ; different letters indicate statistical differences.

^b Common = salmon, cod, tuna; Processed = herring, mackerel, sardines; Exclusive = sole, turbot, angler, brill.

eat fresh fish more regularly, while the Uninvolved consume fresh fish least frequently.

Furthermore, from the total sample, 9.4% indicated never to choose fish in a restaurant, while 5.5% always choose fish. The segments differ significantly regarding their fish consumption in restaurants ($F = 13.11$; $p < 0.001$). Uninvolved fish consumers choose fish less than 4 times out of ten restaurant visits, while Connoisseurs choose fish in a restaurant 6.5 times (out of ten) on average.

Finally, we asked the respondents which specific fish species they consume. From the total sample, only 2.3% indicated they never eat common fish species like salmon, cod or tuna, while 18.4% claim to never eat processed fish (herring, mackerel or sardines) and 29.1% never eat the more exclusive fish species. The segments differ in their consumption (penetration) of common ($\chi^2 = 10.54$, $p < 0.05$) and exclusive ($\chi^2 = 21.24$, $p < 0.001$) fish, but not of processed fish species, which is in line with the findings about claimed processed fish consumption. Common fish is less consumed by Uncertain consumers. Exclusive fish is most consumed by Self-confident consumers and Connoisseurs, i.e. the two segments with higher levels of self-confidence in evaluating fish quality.

4.3.2. Fish benefit and risk beliefs

Beliefs in physical health benefits from eating fish are not equally strong among the four segments ($F = 3.81$, $p < 0.01$), while all segments have the same small disbelief in mental health benefits from fish consumption (Table 7). With respect to risk beliefs (the belief that fish contains contaminants), mean scores are close to the midpoint of the five-point scale and they do not differ significantly between the four consumer segments.

4.3.3. Information variables

The four segments do not differ with respect to the claimed use of mass media, personal or government

Table 7
Food-health awareness, risk and benefit beliefs and information processing across segments

	Segment 1 Uninvolved	Segment 2 Uncertain	Segment 3 Self- confident	Segment 4 Connoisseurs
<i>Benefit and risk beliefs^a</i>				
Belief in physical benefits from fish	3.23a	3.27a	3.43b	3.48b
Belief in mental benefits from fish	2.93a	2.86a	2.97a	2.97a
Belief that fish contains harmful substances ^b	3.01a	2.98a	2.88a	2.95a
<i>Information variables^a</i>				
Use of fish information sources (% yes)				
Mass media	39.8	49.1	50.0	35.9
Personal sources	67.3	63.5	61.5	64.1
Marketing or commercial sources	43.5	55.3	50.0	53.8
Government	12.0	14.0	12.4	13.5
Interest in credence information cues	3.13a	3.56b	3.47b	3.97c
Interest in search information cues	4.02a	4.23b	4.25b	4.38b
Interest in a fish quality label	2.94a	3.23b	3.05a	3.36b

^a Different letters (a–b–c–d) indicate significantly different average scores on five-point scales using ANOVA and LSD post hoc test.

^b Including: dioxins, PCB, pesticide, antibiotic or hormone residues, artificial colorants, heavy metals.

information sources (see Table 7). Only a marginal significant effect is found for marketing or commercial sources ($\chi^2 = 14.96$, $p = 0.092$), with a tendency of lower use of commercial sources by Uninvolved fish consumers.

The mean scores of the four segments on the two information cue factors are reported in Table 7. In general, consumers are more interested in search information ($M = 4.20$) than in credence ($M = 3.47$) information from fish ($t = 20.67$, $p < 0.001$). From all segments, fish Connoisseurs are the most interested in credence information cues, while Uninvolved fish consumers are the least interested. Uncertain and Self-confident consumers score in between the other two segments. Concerning search information, Uninvolved fish consumers are slightly less interested, but no differences in search cue interest are seen between the other segments (ceiling effect). We will elaborate more on these results later in the discussion section.

Finally, major differences exist between the segments with respect to claimed interest in a fish quality label ($F = 5.46$, $p < 0.001$). Connoisseurs and Uncertain fish consumers claim a stronger interest as compared to Uninvolved and Self-confident fish consumers. These findings indicate that fish labels have some potential as a quality cue since they may appeal to interests of consumers with high fish quality involvement, as well as a valuable token of quality for Uncertain fish consumers with poor self-confidence in evaluating fish quality.

Table 8
Socio-demographic characteristics of the consumer segments ($n = 429$), frequency distributions (%)

	Segment 1 Uninvolved	Segment 2 Uncertain	Segment 3 Self- confident	Segment 4 Connoisseurs
<i>Socio-demographic profile (%)</i>				
Female	57.9	72.2	64.8	76.3
Age <25 years	38.3	19.7	14.8	7.9
Age >55 years	8.4	22.9	6.6	26.3
Higher education (>age of 18)	79.2	59.3	67.5	67.6
Children younger than 18 years	22.2	26.4	29.5	28.2
Higher income (>1,700 €/month)	70.2	67.4	66.3	75.0
Coastal region West-Flanders	23.4	22.8	23.8	28.9
Urban	31.1	42.4	32.5	28.9

4.3.4. Demographics

Table 8 presents the socio-demographic characteristics of the segments from the cluster analysis. Significantly more women belong to the segments of Uncertain fish consumers and fish Connoisseurs ($\chi^2 = 7.75$, $p < 0.05$), whereas men rather belong to the segment of Uninvolved fish consumers. In general, females ($M = 3.82$) are found to be more involved with fish quality as compared to men ($M = 3.62$) ($F = 14.46$, $p < 0.001$), while no significant gender difference is found in self-confidence in evaluating fish quality.

With respect to age, consumers aged below 25 years belong particularly to the Uninvolved fish consumer segment, while 55+ aged consumers are significantly more classified as Uncertain fish consumers or fish Connoisseurs ($\chi^2 = 53.60$, $p < 0.001$). In general, as age increases, involvement with fish quality increases ($F = 12.81$, $p < 0.001$). Consumers aged between 40 and 55 describe themselves as the most confident in evaluating fish quality, while consumers younger than 25 years rate themselves as the least able to evaluate fish quality ($F = 8.68$, $p < 0.001$). Education levels differ only marginally between the four segments ($\chi^2 = 15.83$, $p = 0.071$), with a tendency that consumers with a lower education belong more to the Uncertain fish consumer segment.

No significant differences between the segments are found related to presence of children younger than 18, income, region, and place of residence. Consumers belonging to the lowest income class (net family income below 850 euro per month) are less involved with fish quality as compared to consumers who earn more ($F = 3.93$, $p < 0.01$). Inhabitants of rural areas display a higher involvement with fish quality as compared to urban residents ($F = 4.07$, $p < 0.05$).

5. Discussion and conclusions

Results reveal that fish quality evaluation is multidimensional, integrating the perceived importance of fish quality

(referred to as involvement with fish quality) and self-confidence in evaluating fish quality. Both dimensions are related to behavioural and information processing variables and they vary between consumers, which is in line with expectations based on consumer behaviour literature. Using these dimensions for market segmentation purposes through cluster analysis reveals four clusters, which show a highly consistent picture in terms of characteristics like food involvement and food-health awareness, as well as in terms of fish consumption behaviour, risk and benefit beliefs and interest in fish information. Furthermore, the segments can be profiled using classical socio-demographic variables like age and gender, which yields opportunities for targeted communication efforts.

The Uninvolved and Uncertain fish consumers have little confidence in their fish quality evaluation abilities. This associates with lower fish consumption levels, i.e. lower product experience, which corroborates Park and Lessig (1981) and Celsi and Olson (1988). Uninvolved consumers are by far the least involved with fish quality, which logically results in (or from) lowest interest in information. Raising their involvement with fish quality, for instance through stressing personal health benefits from fish consumption, emerges as the most challenging communication strategy for this particular segment. Since low involvement usually associates with less extensive decision-making (Engel et al., 1995), providing too many rational information (cognitive argumentation) is at risk of low effectiveness among this segment. Instead, affective arguments relating to personal health may stand a better chance with the Uninvolved fish consumer segment.

Whereas Uncertain fish consumers do not differ from the Uninvolved in terms of risk and benefit beliefs and fresh fish consumption, they do with respect to fish consumption at restaurants. Clearly, Uncertain consumers, who are relatively highly involved with fish quality, put trust in a third party like an experienced chef in a restaurant, more than in their own purchasing, cooking and fish quality evaluation skills. In a similar vein, Uncertain fish consumers display a strong interest in a fish quality label and display considerable interest in both credence and search information cues. Apparently, they are prone to put trust in other people or institutions, and would regard a fish quality label as a useful token of product quality, which is in line with previous studies by for instance Shapiro (1983), Rao and Bergen (1992), Dodds et al. (1991), Boulding and Kirmani (1993) and Bredahl (2003). The Uncertain fish consumers also tend to make more use of marketing or commercial information sources about fish quality. With this profile, the Uncertain fish consumers constitute the most interesting segment for fish quality labelling and information provision from trustworthy or credible information sources. It should be noted also that this segment is the largest of the sample, accounting for more than one third of the fish consumers. This segment displays some parallels with the segment of 'concerned consumers' in the meat market as identified by Verbeke and

Vackier (2004). These consumers strongly reduced meat consumption as a consequence of meat safety crises, probably shifted to fish, but feel uncertain with respect to the evaluation of fish quality. This was also the segment that was expected to show the strongest interest in meat labels and strongest belief in meat traceability.

Self-confident fish consumers and fish Connoisseurs reported equally high fish consumption frequencies. Besides basic differences in involvement with fish quality and self-confidence in evaluating fish quality – with Connoisseurs reporting higher scores on both dimensions – these segments only differ with respect to interest in information, more specifically credence information cues and a fish quality label. Apparently, self-confidence combined with lower involvement (as compared to connoisseurs) leads to lower interest in credence information, including lower interest in a fish quality label. The segment of Self-confident fish consumers includes more younger consumers, who are either convinced that fish has a high enough quality standard, or who associate quality more strongly with experience attributes like convenience and taste. Fish Connoisseurs are open to more information, especially of the credence type. They also display the strongest interest in a fish quality label, despite their high personal confidence in evaluating fish quality. Since quality is all too important for fish connoisseurs, any additional information signalling product quality, e.g. through a quality label, is warmly welcomed. This corroborates Grunert, Bredahl, and Brunso (2004) who indicated that labels are mostly associated with higher quality. The strong interest in quality labels fits with fish Connoisseurs' high involvement profile, both to fish and food in general, which is proven again to associate with more openness and readiness to process information, in line with the involvement – knowledge association as set forth by Park and Moon (2003). Finally, it should be noted that both the Self-confident and Connoisseurs display the highest belief in health benefits from fish consumption, though the score around 3.4–3.5 definitely leaves some room for further improvement through appropriate communication efforts.

Besides the identification of relevant fish consumer segments based on quality evaluation, this study also confirms associations between involvement defined as perceived importance and product experience and interest in information. In this specific case of fish, product experience associates with higher involvement with quality, and interest in quality information.

Another finding is that the small incidence of scepticism in mental benefits deriving from fish consumption and – more importantly – risk perception do not differ between segments that differ strongly with respect to fish consumption. This is indicative that disbeliefs and risk perceptions are not regarded as major barriers to eating fish.

Furthermore, this study reveals some relevant issues with respect to credence qualities of fish, and fish quality labeling in particular. Whereas previous research indicated that consumers in general attach increasing importance to credence

qualities (Wandel & Bugge, 1997), and sometimes even equal importance to credence and search qualities (Bernués, Olai-zola, & Corcoran, 2003), we must conclude that this does not necessarily hold in the specific case of fish. Interest in credence attributes is ranked substantially lower than interest in search attributes. The gap between interest in search versus credence attributes is highest among consumers with low levels of both involvement with quality and personal confidence in evaluating fish quality (Uninvolved fish consumers). This gap is lowest among fish Connoisseurs. Lower confidence in personal quality evaluation ability was expected to result in a higher willingness to embrace external information about quality, e.g. stronger interest in price (Obermiller & Wheatly, 1985; Zeithaml, 1988) or in a quality label (cfr. Grunert et al., 2004). Our study supports this association. It also shows that uncertainty about evaluating quality associates with a stronger interest in credence qualities and quality labels, though only in the case where involvement with quality is sufficiently high, namely for the Uncertain fish consumers but not for the Uninvolved. Grunert (1997) argued that – in a low involvement situation – consumers may never form quality expectations but associate certain product attributes with their daily purchases and use these to ensure a one-dimensional, non-specific satisfaction with the purchase after consumption. This is clearly the case for the uninvolved fish consumers in our study.

This study has demonstrated the usefulness of investigating quality evaluation as a two-dimensional construct that associates with behaviour, beliefs and information processing related to fish. The main limitation of the study pertains to its use of non-probability sampling and its narrow geographic focus, i.e. Belgium only, which ranks among the lower fish consumption countries in Europe. As a result, generalisations to the broader national or pan-European populations are speculative, and it is recommended to validate the quality evaluation dimensions, the discovered fish consumer segments and their specific behaviours and interests through cross-national, larger and representative consumer samples. Furthermore, the issue of fish quality labelling and consumer interest in fish information and related credence attributes deserves particular attention in future fish consumer research.

Acknowledgements

This work was partly performed within the Integrated Research Project SEAFOODplus, Contract No. FOOD-CT-2004-506359. Partial financing of the work by the European Union is gratefully acknowledged.

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