CONSUMER CONCERN FOR ETHICAL ISSUES IN FISH FARMING _ A SEGMENTATION STUDY[i]

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ABSTRACT

The main objective of this paper was to study consumer concern for ethical and environmental issues regarding fishing and aquaculture. Cross-sectional data was collected in Valencia, Spain. A total sample of 452 consumers was obtained. This study uses descriptive and multivariate techniques to present data, and to obtain and describe the segments.

The analysis resulted in three segments: the unconcerned, the wild fish concerned and the ambivalent. These represented 27%, 35% and 39% of the sample respectively. The segments were profiled with variables age, gender, education, social class, fish consumption, attitudes towards fish, attitudes towards farmed fish, perceived knowledge about fish farming, health involvement and the type of information used when buying fish (product vs. environmental).

Keywords: Consumer ethical concern, fish welfare, farmed fish

INTRODUCTION

Consumers' increasing concern about animal welfare and sustainability issues has achieved increasing attention among the scientific community. Fish welfare is, however, a relatively new topic in consumer research related to seafood. Frewer *et al*. (2005) found that environmental production methods were more important for consumers in selection of fish products than pig products, while the opposite was the case for animal welfare issues in production. Vanhonacker *et al*. (2006) found that environmental issues were more important than welfare issues in the purchase of fish. Other studies have, on the other hand, not found much influence of ecological and animal welfare issues as consumer motives (Lindeman and Väänänen, 2000) on food choice (Eertmans *et al*., 2005; Prescott *et al*., 2002), except for vegetarian (Pollard *et al*., 1998) and organic food items (Honkanen *et al*., 2006). Other motives such as sensory motives seem to be more important in food choice.

We argue that there may be a difference in consumer perceptions of environmental and animal welfare issues related to fish compared with farmed animals. First, farmed animals are to a large extent only available for consumers in that form, so the question whether to buy products originating from farmed or "wild" animals does not arise. Fish, on the other hand, has traditionally been perceived as "wild", living freely in oceans and lakes, so there are several potential issues that consumers face in their purchase decision process. Consumers seem to have a preference for wild captured fish (Gross, 2001), although they cannot tell the difference in blind-tasting, or they may even judge the farmed fish as better in such tests (Kole *et al*., 2003).

Consumer concerns about fish-farming and (wild) captured fish can embrace animal welfare issues related to moral right to keep fish in captivity, whether fish can feel pain in slaughtering process, whether fish are stressed in farmed conditions etc. (Cooke and Sneddon, 2007; Tinarwo, 2006). There are also environmental issues related to both the traditional wild fish harvesting and the new and growing production of farming fish. For the traditional fisheries, overexploitation of fish stocks has become an important issue (Hentrich and Salomon, 2006). There is also some discussion about damage to the seabed

caused by certain fishing-gear. In fish-farming, the environmental problems could also be severe – there are issues like pollution from excess feed, genetic contamination of wild stocks, spread of diseases to wild fish, etc. (Read and Fernandez, 2003).

It is therefore reasonable to expect that some consumers may be quite ambivalent about farmed fish. 'Ambivalence' is a term used to describe contradictions people experience in their individual attitudes, beliefs or preferences (Thompson *et al*., 1995). Gardner (1987: 241) describes ambivalence as a 'psychological state in which a person holds mixed feelings (positive and negative) towards some psychological object'. We are aware of very few studies which have assessed perceived ambivalence toward environmental and animal welfare issues. On the positive side, consumers may consider fish-farming as helping to save wild fish stocks from overexploitation. Fish farming may give the industry better control of the quality and health aspects of the product, and contribute to producing different qualities serving different preferences in global markets (Morris *et al*., 2005). On the other hand, fish-farming can be considered as an activity producing unwanted results such as introducing bacterial immunity in the wild fish stocks or among people (Cotter *et al.*, 2000) or genetic contamination of wild stocks. The use of marine feed can also be a potential problem from a moral point of view, because of usage of fish for feed that could be used as human food (Kaiser, 2006). There is some evidence that consumers may evaluate farmed fish more negatively than wild fish (Jaffry *et al*., 2004), but the reported research is still very limited (Berg, 2002). Kole *et al*., (2003) showed that consumers who received information about fish being farmed had more negative attitudes towards the fish than did those who received information about fish being wild.

The purpose of this research was to study the importance of fish welfare and environmental issues for the consumers. Consumer perceptions about farmed fish were also assessed, since earlier studies seem to indicate that farmed fish has an inferior status compared to wild captured fish. Second, we wanted to explore whether consumers differ in their concern by looking for segments based on animal welfare and environmental concern. We have also chosen to include an ambivalence measure in the segmentation basis because the issue might be perceived as ambiguous by some consumers.

METHODOLOGY

A quantitative consumer survey was carried out in Valencia, Spain. A professional market research agency was used to collect the data by personally delivering the questionnaire and then collecting it later at agreed upon time. 500 participants were recruited by a random route method to ensure 450 usable questionnaires. A filter was used to match the respondents with certain socio-demographic data (gender, age and household size).The most important screening issue was that the participant had the main responsibility for buying and preparing the food in the household in general and buying and preparing fresh seafood in particular. This is the reason why the proportion of men (7%) was lower than that of women (93%).

A quite extensive questionnaire was developed, benefiting from previously developed scales and measures in the literature (e.g., Conner and Sparks, 2002; Lindeman and Väänänen, 2000; Olsen, 2003; Pieniak *et al*., 2007; Roininen *et al*, 1999). The questionnaire had multi-item questions and consisted mainly of a mix of seven-point semantic-differential and seven-point Likert-type scales. The reliability of the scales was assessed by Cronbach's Alpha. The Cronbach's alpha varied between 0.68 (ethical concern fish farming) to 0.96 (the ambivalence scale). A detailed list of variables and items can be found in Appendix 1. The Spanish agency which was used for fieldwork was also responsible for ensuring the quality of the language of the questionnaire which was translated from English to Spanish.

Procedures
The TwoStep cluster analysis (SPSS 16) with log-likelihood distance measure was performed in order to obtain consumer segments. The procedure combines sequential and hierarchical approaches by first pre-clustering and then sub-clustering the data. The number of clusters is automatically found by use of BIC (Bayesian information criterion) as clustering criterion. Our analysis was based on consumers' concern for environmental and animal welfare issues related to wild fish and farmed fish. Ambivalence was also used together with the mentioned variables as basis.

Univariate general linear model with Sheffe's post-hoc difference tests, and cross-tabulation (chi-square) were used to profile the segments with socio-demographic variables, consumption variables, perceived knowledge about fish-farming, use of information, attitudes towards fish and farmed fish, health involvement, and importance of natural food products.

RESULTS

This section will first present some descriptive results in the form of mean values and frequencies. Thereafter, the results of the cluster analysis will be presented.

Descriptive results
The consumers in the study seemed to be very concerned about environmental issues related to fishing, while the fish welfare issues concerning farmed fish were of less concern, as table I shows. On the contrary, it seems that consumers in the sample did not have any ethical problems with consuming farmed fish. They also seemed to think that fish farming is beneficial for fisheries by diminishing over-exploitation of wild fish stocks.

Table I Consumer concern for fish and farmed fish. Mean values

Concern for fish in general*	Mean	Std. Deviation
Has been produced in a way which has not polluted the sea or the other environments	6.4	1.0
Produced in an environmental friendly way	6.3	1.1
Not threatened by over-fishing and loss species on the border of extinction	6.1	1.3
Produced with respect to their rights and well being	5.9	1.4
Has been caught and produced without suffering	4.9	1.8
Concerns related to farmed fish**		
I have no ethical concerns eating farmed fish	4.9	1.6
Fish farming can help to diminish over-exploitation of wild stocks	4.7	1.8
Fish farming violates animal rights	3.1	1.5
The slaughtering of farmed fish causes unnecessary suffering for the fish	3.1	1.5
Fish farming pollutes the environment	3.0	1.4
Fish farming is harmful for wild fish stocks	3.0	1.5

* Scale from 1= "Not important" to 7= "Very important"
** Scale from 1= "Totally disagree" to 7= "Totally agree"

The consumers in the sample seemed to have quite positive perception of farmed fish, which was somewhat unexpected with quite negative media attention lately (toxins in farmed salmon etc.). The perception of quality, nutritional value and safety were considered to be quite good. The consumers also did not agree with the statements about the alleged negative sides of farmed fish such as content of antibiotics and disease in the fish.

Table II Consumer perceptions of farmed fish. Mean values

Perceptions of farmed fish	Mean	Std. Deviation
Farmed fish has good quality	5,2	1,1
Farmed fish is nutritious	5,1	1,1
Farmed fish is safe to eat	5,0	1,2
Farmed fish contains antibiotics	3,3	1,4
Farmed fish often has diseases	3,1	1,4

Scale from 1= "Totally disagree" to 7= "totally agree"

On the other hand, the sample seemed to have slightly more positive attitudes towards fish in general than farmed fish, as table III shows.

Table III Attitudes towards fish in general and farmed fish especially. Mean values

	Fish	Farmed fish
I feel satisfied when I have ... for dinner	5.3	4.1
I like ... very much for dinner	5.2	4.0
... for dinner gives me a pleasant feeling	4.9	4.0

Scale from 1= "Totally disagree" to 7= "totally agree"

Segmentation

The segmentation analysis gave an optimal solution with three clusters. None of the segments were very concerned about farmed fish welfare, as Table IV shows. On the contrary, none of the clusters had ethical concerns eating farmed fish – they even thought that farmed fish may help protect the wild fish stocks. There were, however, some differences among the clusters.

The respondents in Cluster 1 (27%) were not very concerned about farmed fish welfare, but had higher scores on these issues compared with the other two clusters. But this segment was somewhat more ambivalent about farmed fish than cluster 2. This group was the least concerned about fish welfare in general and environmental issues, although the last mentioned seemed to be important. Cluster 1 was called *The Unconcerned***.**

Cluster 2 (34.5%) were very concerned about the general fish welfare and environmental issues, but not at all about the possible welfare issues in fish-farming. They were also not ambivalent about farmed fish. This cluster was called *The Wild fish concerned***.**

The respondents in cluster 3 (38.5%) were concerned both with fish welfare and environmental issues. They were not very concerned about farmed fish, but they felt rather ambivalent about farmed fish. The cluster 3 was called *The Ambivalent***.**

Table IV Cluster descriptors. Mean values (ANOVA)

	The Unconcerned	Wild fish concerned	The Ambivalent		
Size of the cluster (% of the sample)	27.0%	34.5%	38.5%	F	p.
Environmental issues and fish welfare in general					
Has been produced in a way which has not polluted the sea or the other environments	5.3 [a]	6.8 [c]	6.9 [c]	188.2	0.0000
Has been caught and produced in an environmentally-friendly way	5.0 [a]	6.7 [c]	6.9 [c]	239.6	0.0000
Is not threatened by over-fishing and loss of species on the verge of extinction	4.6 [a]	6.6 [b]	6.8 [c]	282.9	0.0000
Has been caught and produced with respect to its rights and well-being	4.3 [a]	6.3 [c]	6.6 [c]	207.8	0.0000
Has been caught and produced without suffering	3.6 [a]	5.0 [b]	5.7 [c]	63.8	0.0000
Fish welfare in aquaculture					
I have no ethical concerns eating farmed fish	4.7 [a]	5.4 [c]	4.6 [a]	11,8	0.0000
Fish-farming can help to diminish over-exploitation of wild stocks	4.4	4.8	4.7	2.5	0.0856
Fish-farming violates animal rights	3.8 [c]	2.1 [a]	3.6 [c]	80.8	0.0000
Fish-farming pollutes the environment	3.6 [c]	2.0 [a]	3.4 [c]	73.4	0.0000
The slaughtering of farmed fish causes unnecessary suffering for the fish	3.6 [c]	2.1 [a]	3.6 [c]	68.5	0.0000
Fish-farming is harmful for wild fish stocks	3.6 [c]	1.9 [a]	3.5 [c]	84.7	0.0000
Ambivalence farmed fish					
I have mixed feelings about farmed fish	3.6 [b]	1.4 [a]	4.1 [c]	304.9	0.0000
I have conflicting thoughts about farmed fish	3.6 [b]	1.5 [a]	4.1 [c]	313.6	0.0000
My thoughts and feelings about this farmed fish are conflicting	3.5 [b]	1.5 [a]	4.0 [c]	260.7	0.0000

The a-c indicate significantly different means. Univariate general linear model with Sheffe's post hoc difference test has been used to assess significant differences between segments.

Profiling the segments

The segments were profiled with variables measuring the type of information used when buying fish (product-related vs. environmental), attitudes towards fish, attitudes towards farmed fish, the importance of food naturalness, health involvement, knowledge about fish-farming, fish consumption, age, gender, social class and education. Of these variables, attitudes toward farmed fish, the importance of food naturalness and social class were the most important in profiling differences between clusters. The variable age did not discriminate between clusters. A summary of the results from the profiling is presented in Table V.

Table V Cluster profiles

	The Unconcerned	The Wild fish concerned	The Ambivalent	Total	F	p.
Environmental information (mean)	3.3[a]	4.0[c]	4.1[c]	3.9	9,801	0.0001
Product information (mean)	5.4[a]	5.8[c]	5.8[c]	5.7	7.254	0.0008
Attitude farmed fish (mean)	4.3[a]	5.1[c]	4.4[a]	4.6	48.754	0.0000
Attitude fish (mean)	4.8[a]	5.3[c]	5.2[c]	5.1	4.931	0.0076
Naturalness (mean)	6.2[a]	6.6[c]	6.7[c]	6.5	24.074	0.0000
Health involvement (mean)	6.2[a]	6.6[c]	6.5[c]	6.5	8.608	0.0002
Knowledge of fish-farming (mean)	3.8[a]	4.7[c]	3.9[a]	4.1	13.741	0.0000
Consumption fish (mean)	1.8[a]	2.2[c]	2.0[a]	2.0	2.995	0.0510
Age (mean)	39.6	40.8	41.9	40.9	1.652	0.1928
	The Unconcerned	The Wild fish concerned	The Ambivalent	Total	Pearson chi square	p.
Gender (% of the sample)					13.441	0.0012
Male	13.8	6.4	2.9	7.0		
Female	86.2	93.6	97.1	93.0		
Social class (% of the sample)					16.903	0.0100
High	9.8	9.6	1.7	6.6		
Medium-high	15.4	22.9	18.3	19.1		
Medium	60.2	59.2	64.0	61.3		
Medium-low	14.6	8.3	16.0	13.0		
Education (% of the sample)					9.6590	0.047
Lower	54.5	43.9	55.4	51.2		
Middle	36.6	38.9	36.6	37.4		
Higher	8.9	17.2	8.0	11.4		

The a-c indicate significantly different means. Univariate general linear model with Sheffe's post hoc difference test has been used to assess significant differences between segments

Respondents in all three segments seemed to rate product-related information as the most commonly-used information type when buying fish. This is information about species, weight, price, etc. The Wild fish concerned and The Ambivalent consumers used this type of information most often. Environmental information (fish welfare, wild/farmed fish, etc.) was also most often used by The Wild fish concerned and The Ambivalent, while environmental information was not an important source of information for The Unconcerned.

The Wild fish concerned had the most positive attitudes towards both wild and farmed fish. The latter finding is not surprising, since this group showed very low concern for the fish welfare issues for farmed fish. Although all segments had positive attitudes towards both wild and farmed fish, The Unconcerned consumers had the least positive attitudes. The Ambivalent had considerably higher score for wild fish attitudes than farmed fish attitudes, reflecting the ambivalent relation this group has towards farmed fish.

Respondents in all segments had a strong health involvement, with scores above 6,2. The strongest involvement seemed to be among The Ambivalent and the Wild fish concerned. All groups were also very concerned about the healthiness and naturalness of the food they eat, but the highest concern was among the same two groups as for health involvement.

The perceived knowledge about fish-farming was highest among The Wild fish concerned consumers, while the difference was not significant between the other two groups. In fact, Table V shows that these two groups had low perceived knowledge.

Consumption frequency of fish was highest among The Wild fish concerned consumers, who had a frequency of 2,2 times a week. The lowest frequency was found among The Unconcerned group with consumption of 1,8 times a week. The difference in means of fish consumption between the segments was nearly significant at 95 % level (F= 2,995, p=0,051), also the Sheffe's post hoc measure showed significant difference between The Unconcerned and The Wild fish concerned, thus indicating difference between the segments.

There were clear tendencies in gender distribution among the segments, but given that most of the respondents were women, the results have to be interpreted carefully. It seems, however, that most men belonged to The Unconcerned group, while most women were in The Ambivalent group. The Wild fish concerned had both men and women among them. Social class was a variable introduced by the research agency based on education and occupational status. The highest social class was among The Unconcerned and the Wild fish concerned, while those in the lower-middle social class belong to The Ambivalent. The Unconcerned and The Ambivalent had lower education levels than the Wild fish concerned, which includes people with both medium and higher levels of education.

DISCUSSION

This research aimed at exploring the importance of fish welfare and fish-related environmental and sustainability issues for the consumers. The results confirmed earlier findings (Frewer *et al.*, 2005; Vanhonacker *et al*., 2006) that consumers are more concerned about environmental and sustainability issues than animal/fish welfare issues. Fish farming is not in general considered to be an ethical problem among consumers in Valencia. In fact, consumers in the study had quite positive perception of farmed fish, considering it to be healthy, nutritious and safe food. It seems that many consumers thought that fish farming has a positive effect on fisheries as well, saving fish stocks from over-exploitation. These findings contradict the generally-accepted view that animal welfare issues in food production are becoming more and more important for consumers in Europe (Bornett *et al*., 2003; Frewer *et al*., 2005). These issues are, however, mainly related to agricultural practices. The media coverage of fish welfare issues has also been quite poor in Spain, and thus the topic may be unfamiliar to Spanish consumers.

Although we found three clusters which clearly differ in their strength of concern for fish welfare and environmental issues, all three clusters rated the environmental and sustainability issues as the most important, while there were some differences in concern for farmed fish.

Most respondents in the study used product-related information more often than animal welfare and environmental information when buying fish. This may be an indication that the last-mentioned issues are not at the top of the consumers' mind when they are shopping for food, thus having implications for communication strategies, which should be focused on the product features rather than environmental issues. On the other hand, the availability of environmentally (or animal welfare) labelled fish products, and thus knowledge and awareness about them, is quite limited in Spain, thus having an impact on information usage rates.

It seems that the knowledge level about fish-farming is quite low in Valencia, even though Spain is one of the countries in Europe with high fish consumption (Honkanen and Brunsø, 2005). It is striking, though, that it is The Wild fish concerned that have highest perceived knowledge about fish farming practices, at the same time as they have the lowest level of concern towards fish welfare issues in fish farming. The low level of knowledge may lead to ambivalent attitudes towards fish, farmed or wild, potentially lowering the fish consumption. There is a need to educate people about the different types of origins of fish products. In this study, it was especially women with lower education that were likely to be ambivalent about farmed fish. The educational level also differed among the clusters, implying that communication towards those with lower education should probably consist of quite short and easy-to-understand messages. The degree to which knowledge and educational level influence consumers' comprehension of animal welfare and environmental messages should be studied closer in order to be able to design more targeted information and communication strategies.

From a marketing point of view, farmed fish should not face any big problems in this part of the Spanish market (Valencia area); none of the segments seem to be concerned about farmed fish welfare. The segment with the Unconcerned is probably the most difficult segment to persuade to increase their fish consumption. These respondents do not have animal welfare concerns over farmed fish, but they do have the lowest consumption of fish and least positive attitudes towards fish. The Ambivalent have some doubts about farmed fish welfare, but they also have low perceived knowledge about farmed fish. This group could be targeted by increasing their knowledge about fish farming.

The results do not seem to open for product differentiation on fish welfare issues, because the issue does not seem to be important for the consumers. Sustainability and environmental issues, on the other hand, could be used to position farmed fish products in Spain, focussing on positive influence on wild stock preservation.

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Appendix 1: Variables used in the analysis, with reliability indicators (Cronbach's Alpha)

Variable/ Items	Cronbach's Alpha
Concern for fish welfare and environmental concern: "It is important to me that the fish I eat on a typical day…":	0.86
Has been produced in a way which has not polluted the sea or the other environments	
Has been caught and produced in an environmentally-friendly way	
Is not threatened by over-fishing and loss species on the border of extinction	
Has been caught and produced with respect for their rights and well-being	
Has been caught and produced without suffering	
Ethical concern for fish farming	0.68
I have no ethical concerns about eating farmed fish	
Fish-farming can help to diminish over-exploitation of wild stocks	
Fish-farming violates animal rights	
The slaughtering of farmed fish causes unnecessary suffering for the fish	
Fish-farming pollutes the environment	
Fish-farming is harmful for wild fish stocks	
Ambivalence towards farmed fish	0.96
I have conflicting thoughts about farmed fish	
I have mixed feelings about farmed fish	
My thoughts and feelings about farmed fish are conflicting	
Attitudes towards fish and farmed fish	0.91/0.93
I like fish / farmed fish very much for dinner	
I feel satisfied when I have fish/ farmed fish for dinner	
Fish/ farmed fish for dinner gives me a pleasant feeling	
Health involvement	0.87
It means a lot to me to have good	
Good health is important to me	
I often think about my health	
I think of myself as a person who is concerned about healthy food	
I am very concerned about the health-related consequences of what I eat	
Importance of food naturalness: It is important to me that the food I eat on a typical day…	0.88
Keeps me healthy	
Is nourishing	
Is produced without additives	
Is processed as little as possible	
Is as natural as possible	
Information use – product information	0.68
Fish species/name	
Weight	
Nutritional composition	
Brand name	
Price	
Quality label	
Expiry date	
Information use – environmental information	0.90
Country of origin	
Fish welfare	
Capture area	
Wild/Farmed	
Environmentally-friendly	

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