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Comparing fish to meat: Perceived qualities by food lifestyle segments

Jonas K. Torrissen and Yuko Onozaka

Department of Industrial Economics, Risk Management and Planning, University of Stavanger, Stavanger, Norway

ABSTRACT

This article compares consumers' quality perceptions (in freshness, taste, food safety, value for money, and availability) of proteins from the sea (salmon and cod) and land (chicken, pork, and beef) using intensity of consumers' food involvement measured by food-related lifestyles (FRL) as an explaining factor. Based on an international survey of around 2000 consumers in four countries, the analysis finds that consumers with high food involvement scores rate fish higher than low involvement score consumers, often favorably to terrestrial meats. Low involved consumers perceive terrestrial meats more favorably than seafood. Seafood struggles with perceived value for money and availability compared to terrestrial meats, particularly among the low and middle involvement groups. The results indicate that low involvement consumers might not consider seafood a substitute for terrestrial meats, in contrast to higher food involvement groups.

KEYWORDS

Cod; food-related lifestyle; perception; salmon; seafood consumption

Introduction

The worldwide consumption of seafood has shown continuous growth over the past five decades. The average annual per capita consumption of seafood increased by 10 kg, from 9.9 kg in the 1960s to 19.2 kg in 2012 (Food and Agricultural Organization of the United Nations, 2014). One of the major factors contributing to this growth is the technological innovation and expansion of distribution channels, which made seafood products available more consistently to larger numbers of consumers (Asche, 2008; Tveterås et al., 2011; Kobayashi et al., 2015). Furthermore, seafood products are identified as healthy foods, with some scientifically proven health benefits (Mozaffarian & Rimm, 2006). Studies report that many consumers do understand the health benefits associated with fish consumption, which motivates consumers to eat more seafood (Brunsø, Verbeke, Ottar Olsen, & Fruensgaard Jeppesen, 2009; Altintzoglou et al., 2010).

Despite the growth in consumption, improved availability, and association with health benefits, research finds that the recommended fish intake is often

not achieved (Myrland, Trondsen, Johnston, & Lund, 2000; Pieniak, Verbeke, Scholderer, Brunsø, & Olsen, 2007; Altintzoglou, Vanhonacker, Verbeke, & Lutén, 2011). Governmental and non-governmental programs are often in place to promote seafood intake between 1 to 4 servings per week (European Food Safety Authority, 2014). Yet many industrial countries, the countries with the highest rate of annual fish consumption per capita at 27.4 kg, fail to achieve the recommended intake (Food and Agricultural Organization of the United Nations, 2014). There may be a number of reasons as to why fish consumption remains below the recommended amount, such as sensory perception (smell, taste, texture etc.), fish eating habits, convenience perception, self-efficacy (confidence in one's own ability), price perception, availability, and health beliefs (Carlucci et al., 2015). Consumers' heterogeneity of preferences, knowledge, and perceptions of seafood (Welch et al., 2002; Onozaka, Hansen, & Sørvig, 2014) can also be contributing factors.

In addition to the factors directly related to seafood, it is also crucial to understand how consumers view seafood products *relative to* the substitutes — other meat products. Imagine food shopping occasions where consumers select food products for main dishes. On these occasions, comparisons are made between seafood and land-based meat products. Thus, analyzing perceptions of fish compared to land-based meats can provide reasons why the consumption rates are much lower than other land-based meats, and lower than the amount recommended by health authorities. However, the perception differences between seafood and terrestrial meats are not well understood. Although the research on perception of seafood (Grunert, Bredahl, & Brunsø, 2004; Verbeke, Sioen, Brunsø, De Henauw, & Van Camp, 2007a) and terrestrial meat (Castellini, Berri, Le Bihan-Duval, & Martino, 2008; Onozaka, Hansen, & Tveterås, 2012) separately is substantial, research comparing the perception of seafood to terrestrial meat is rare (Russell & Cox, 2003, 2004; Grimshaw et al., 2014), and does not focus on food involvement.

This study aims to identify barriers and drivers for seafood consumption, including: sensory perception (taste, smell, texture etc.), health benefits, convenience, availability, and price. The study also attempts to compare directly the perceived qualities of seafood products (salmon and cod) to land-based meat products (chicken, beef and pork). Consumer heterogeneity is incorporated through segmenting consumers based on their food involvement score, using the food-related lifestyles (FRL) instrument. The FRL was first introduced in the 1990s (Brunso & Grunert, 1995), and is built on the means-end chain approach, specifically designed to link consumers' basic values to more specific food choices. The instrument segments consumers based on both demographic information and their values and attitudes related to food. The FRL has been shown to be applicable across cultures, and tested in numerous European, other western, and non-western cultures for consumers' heterogeneity in food-related behavior (see next).

Drawing upon a recently conducted international survey with over 2,000 respondents, this study examines how consumers, categorized into different FRL groups, view salmon and cod compared with other common land-based meat sources (chicken, beef and pork) in four European markets (United Kingdom, France, Germany and Sweden). This article adds to the literature by examining food-related lifestyle as a tool to explore perception of quality cues for terrestrial meats and seafood with consumer segmentation.

Literature review

Barriers and drivers for seafood consumption

Studies have found that the majority of consumers have positive attitudes towards eating fish (Brunso et al., 2009; Pieniak, Verbeke, Olsen, Hansen, & Brunso, 2010), and the positive attitude towards eating fish strongly correlates with consumption frequencies (Rortveit & Olsen, 2009; Altintzoglou et al., 2011). Fish consumption is expected to be highly determined by the consumers' sensory perceptions. Since these are product specific, it is difficult to investigate for a heterogeneous food category. To accommodate this, researchers often use "attitude towards eating fish" as a proxy to evaluate positive or negative perceptions to eating fish (Carlucci et al., 2015). The assumption is that the more positive the consumers' attitude is towards eating fish, the more likely they are to consume it. Not only is the individual's perceptions about fish important, but other household members' preferences are also important to consumption rates. Household members who have positive attitudes towards fish consumption are less likely to prepare fish dishes when other members of the household hold negative attitudes toward fish (Brunso et al., 2009; Pieniak et al., 2010).

In addition to sensory perceptions, the health benefits related to seafood is a driver for consumption. The notion that seafood has beneficial health properties is widespread by now, but can be traced back to studies on low coronary heart disease (CHD) mortality among the native population of Greenland (Bang & Dyerberg, 1980). Seafood has since been classified as a healthy food that contains essential nutrients such as iodine, selenium, calcium, and vitamins A and D (European Food Safety Authority, 2014; Nesheim & Yaktine, 2007). Seafood is also the main dietary source for N-3 long-chain poly-unsaturated fatty acids (LCPUFAs, or omega-3), which are associated with many health benefits (Mozaffarian & Rimm, 2006). Because of this, many countries have recommended fish consumption guidelines. For example, the European Food Safety Authority (2014) observes that health benefits from consuming fish start at 1–2 servings per week, and increase at 3 to 4 servings per week, compared to no fish consumption.

Even though there are concerns among consumers regarding the content of contaminants within seafood (Carlucci et al., 2015), research shows that

consuming up to 3 to 4 servings of fish per week has net positive benefits to health, by weighing positive effects of the beneficial nutrients against the adverse effects from contaminants such as methylmercury. Nonetheless, knowledge regarding specific health risks associated with consuming fish are low among consumers (Burger & Gochfeld, 2009), and may not significantly impact the level of fish consumption (Verbeke, Vermeir, & Brunsø, 2007c). Concerns about the production of seafood, either through overfished fisheries (Verbeke, Vanhonacker, Sioen, Van Camp, & De Henauw, 2007b) or controversies around aquaculture (Torrissen et al., 2013) is often prevalent in large seafood producing countries. However, a recent study conducted in Norway showed that negative media coverage about farmed Atlantic salmon, such as: escapes, diseases and environmental concerns did not influence the demand for salmon in Norway (Liu, Lien, & Asche, 2016). However, the attribute “wild” is increasingly shown to have value (Roheim, Sudhakaran, & Durham, 2012; Uchida, Onozaka, Morita, & Managi, 2014; Asche, Larsen, Smith, Sogn-Grundvåg, & Young, 2015c).

Another important factor determining fish consumption is the perception of convenience (Brunso et al., 2009; Altintzoglou et al., 2010; Carlucci et al., 2015). The desire to save time and effort on food preparation is an incentive for providing convenient products for consumers. Fresh fish is often considered an inconvenient product in markets such as Norway, Denmark, Iceland, Belgium, Italy and Spain (Carlucci et al., 2015). Even though some consumers indicated a desire to consume more fish, they showed concern about the time and effort required to prepare fresh fish. Some studies have explored the relationship between convenience orientated personality characteristics and the perceived product convenience for fish, and found that Belgian, Italian, Norwegian, Spanish, Polish, and Dutch consumers view fish as a fairly inconvenient product, having a negative impact on consumption frequencies (Rortveit & Olsen, 2009). Although the emergence of fresh and chilled fish fillets in different serving sizes is seen as a highly convenient product, it is still rated lower than both frozen and ready-meal products in convenience (Neale et al., 2012).

Price is another barrier to increased fish consumption. While there are a wide variety of fish products in all price categories, consumers view them as expensive and often less filling than terrestrial meat products (Carlucci et al., 2015). In some markets consumers perceive that there are no cheap species or forms of fish, while other meats have mince and sausages as “cheap” options to prepare (Brunso et al., 2009). Consumers in Denmark, Norway, and Iceland perceive fish to be too expensive, indicating price being one of the most important barriers to increasing fish consumption (Altintzoglou et al., 2010). Competition between farmed and wild-caught fish can also influence the price of fish. The German whitefish market shows clear market integration between farmed species, in particular tilapia and pangasius, and

wild-captured species, such as cod (Bronnmann, Ankamah-Yeboah, & Nielsen, 2016a; Bronnmann & Asche, 2016b). Because the landings from fisheries are expected to remain stable, and production of and trade with aquaculture products are expected to grow, (Asche, Bellemare, Roheim, Smith, & Tveteras, 2015a; Kobayashi et al., 2015; Abate, Nielsen, & Tveterås, 2016) it is expected that the price of cod will decline. Additionally, there are consumers willing to pay for production practices that are seen as environmentally friendly, one such distinction being between fisheries and aquaculture (Onozaka & McFadden, 2011).

Availability of fish products might also act as a hinderance to consumption. If there is a lack in the assortment of products available for a desired species, other available species seem to be weak substitutes to the preferred species. Rortveit & Olsen (2009) found that the large selection set of fish products had a significant positive effect on consumption. This includes species variation and product type (fresh, frozen, ready-meal, and other value-added products). The concentration of available fish products seems to be positively linked to the rate at which fish is consumed.. Availability is particularly an issue with species that are highly seasonal, like the Northeast Arctic cod, which is harvested in the first few months of the year (Standal & Utne, 2007). Furthermore, weather can adversely affect supply (Tomek & Kaiser, 2014), which can affect the migratory patterns of the North Atlantic cod (Drinkwater, 2005). All these condition can influence the value of fish and which market channels can be serviced (Asche, Chen, & Smith, 2015b). Thus, the width and depth of the market is still subject to various constraints and to the perishable nature of seafood products. Although the availability of fish has improved dramatically in the past few decades, these constraints might still put fish behind meat products in terms of availability and supply consistency.

Food-related lifestyles

The consumer process of choosing a product is complex and there is much research on purchasing behavior from the consumer's perspective. *Lifestyle* has been explored in the literature as a group of factors that can assist in explaining consumer behavior. With food, purchasing behavior focuses on utility and value judgements (Brunso, Scholderer, & Grunert, 2004a; Tomek & Kaiser, 2014) and *lifestyle* (Anderson Jr & Golden, 1984; Kahle & Kennedy, 1989; Kucukemiroglu, 1999; Kaynak & Kara, 2001). Lifestyle consumption is highly price dependent based on product attributes (Roheim, Gardiner, & Asche, 2007). This is shown to be the case also in Germany by Bronnmann and Asche (2016b).

Lifestyle was, in early literature, viewed as a combination of consumers' activities, interests, and opinions (AIO) items. This method has been

criticized for being too vague and lacking a theoretical basis (Brunso, Scholderer, & Grunert, 2004b; Scholderer, Brunso, Bredahl, & Grunert, 2004). The FRL was constructed to capture *lifestyle* with more theoretical rigor, and builds on the means-end chain approach (Brunso et al., 2004a). It deviates from the traditional AIO view by organizing consumer behavior in a hierarchical cognitive structure. The top-end of the hierarchy is based on personal values that Brunso et al. (2004a, p 665) defines as “abstract-trans-situational aggregate cognitive categories.”

In other words, these are the values that are overarching and often define the individual. The lower-end of the hierarchy refers to product perceptions that are seen as situation specific. Lifestyle, in the FRL sense, is the system of interactions between the product and situation-specific views to the abstract cognitive categories, and finally to personal values (Scholderer et al., 2004). The FRL instrument allows for both procedural and declarative knowledge. Where declarative knowledge attributes meaning to the feelings surrounding products, procedural knowledge refers to the behaviors associated with the representation of a product, meaning that FRL allows for both bottom-up and top-down information processing routes (Brunso et al., 2004b). The FRL instrument is relevant to the present study as it was developed specifically to supplement demographic data by adding food preferences and involvement when segmenting consumer groups (Nie & Zepeda, 2011).

The FRL consists of 69 Likert scale question, ranging from 1 to 7. It is then contracted into 23 dimensions fitting into five domains related to food-related lifestyles: ways of shopping, cooking methods, quality aspects, consumption situation, and purchasing motives (Brunso & Grunert, 1995; Brunso et al., 2004b; Scholderer et al., 2004).

The FRL instrument has been tested for cross-cultural validity. Existing research shows the tool is robust when applied to multiple European countries (Brunso, Grunert, & Bredahl, 1996; Grunert et al., 2001; Brunso et al., 2004b; de Boer, McCarthy, Cowan, & Ryan, 2004; Scholderer et al., 2004; O’Sullivan, Scholderer, & Cowan, 2005; Wycherley, McCarthy, & Cowan, 2008), the United States (Nie & Zepeda, 2011), and with some adjustments in non-Western cultures (Askegaard & Brunso, 1999; Fang & Lee, 2009; Grunert et al., 2011).

Based on the preceding, the FRL instrument should be able to indicate quality and food preferences between consumer segments. The literature has, to this point, not focused on how lifestyle affects the perception and preference of various meat types (seafood and terrestrial meats). In instances where meat groups have been contrasted, it focused on animal handling and welfare issues (Grimshaw et al., 2014), or examined specific product types against demographic groups (Russell & Cox, 2003, 2004) rather than food involvement.

Survey

The quantitative descriptive data used in this analysis is from an online survey conducted in 2012. It was designed to examine key markets for Norwegian salmon and cod (United Kingdom, France, Germany, Russia and Sweden). A third-party agency, Survey Sampling International, administered the questionnaire and used their panel members (based on demographic data) to mirror the general population. The target sample for the questionnaire was 500 completed responses from each market. The questionnaire was designed to explore the participants' FRL, product perceptions, and consumption frequencies, in addition to demographic characteristics. The summary of basic demographic characteristics of respondents in each country are shown in Table 1.

The demographic split was 51% male and 49% female participants in Germany, France and Sweden, while the split was 54% female in the United Kingdom. The mean ages of the participants were 42 in United Kingdom, 42 in Germany, 49 in France and 43 in Sweden. In the United Kingdom, almost half of the participants were single (48%), and this group was also largest in Germany (42%), France (36%) and Sweden (34%). Education level was highest in the United Kingdom and France where 43% and 45% had post-graduate levels of education, respectively. In Germany, the largest group was the group that finished high school (54%), and in Sweden it was the group that completed the undergraduate level (46%). The household size varied

Table 1. Sample statistics.

Category	United Kingdom	Germany	France	Sweden
Gender				
Male	46%	51%	51%	51%
Female	54%	49%	49%	49%
Civil Status				
Single	48%	42%	36%	34%
Married	24%	29%	26%	32%
Divorced	7%	10%	11.0%	8%
Widowed	2%	2%	0.4%	2%
Domestic partner/cohabitant	19%	17%	26%	24%
Age				
20–29	21%	22%	26%	22%
30–49	26%	48%	48%	44%
50–59	39%	19%	14%	15%
60+	14%	11%	12%	18%
Avg. Age	42	42	49	43
Education				
Secondary School	23%	54%	16%	42%
Undergraduate	34%	25%	39%	46%
Postgraduate	43%	21%	45%	13%
Household size	2.86	2.40	2.74	2.36
No of Children	1.56	1.40	1.63	1.39
Median income group	GBP 20 K – 30 K	EUR 24 K – 50 K	EUR 24 K – 50 K	SEK 300 K – 500 K
N	495	476	476	500

from 1.39 (Sweden) to 1.63 (France), and the median income group was found to be the lowest in the UK (~USD 30,000 to 45,000) and highest in Sweden (~USD 35,000 to 60,000).

Due to space limitations, the original FRL instruments were adjusted by reducing the original 23 dimensions to 7 dimensions that are relevant to sea-food consumption (freshness, health, taste, cooking methods, convenience, importance of product information, and the price – quality relationship). The ranking of the dimension values was on a Likert scale ranging from 1 to 7, where 7 indicated strong agreement with the presented statements. The descriptive statistics for the FRL metrics are presented in Table 2. The results show that the lifestyle dimension with the highest mean is the price – quality relationship, followed by freshness and taste, while the lowest mean is convenience. These dimensions were then used to create consumer segments within each market, which are explained in the next section.

The questionnaire also included questions regarding the participants' perception of salmon and cod, compared to other common animal protein sources (chicken, pork and beef). These product perception questions were also conducted using a Likert scale ranging from 1 (extremely poor) to 7 (superior) in the areas of *good taste*, *healthiness*, *value for money*, *convenience*,

Table 2. Mean scores for food lifestyle dimension by country.

Food Lifestyle Dimensions	Country	Mean	Std Dev.
Importance of product information	United Kingdom	4.89	1.30
	Germany	4.86	1.36
	France	4.72	1.27
	Sweden	4.72	1.34
Health	United Kingdom	4.93	1.29
	Germany	5.35	1.11
	France	5.09	1.27
	Sweden	4.78	1.39
Price quality relationship	United Kingdom	5.78	0.92
	Germany	5.77	1.02
	France	5.52	1.08
	Sweden	5.44	1.07
Taste	United Kingdom	5.19	0.82
	Germany	5.43	0.88
	France	5.18	0.87
	Sweden	5.03	0.83
Freshness	United Kingdom	5.43	1.12
	Germany	5.41	1.28
	France	5.18	1.24
	Sweden	5.36	1.25
Interest in cooking	United Kingdom	4.64	1.28
	Germany	4.36	1.25
	France	4.81	1.25
	Sweden	4.83	1.28
Convenience	United Kingdom	3.44	1.30
	Germany	3.31	1.25
	France	3.85	1.07
	Sweden	2.55	1.07

Table 3. Descriptive statistics on perception of meat types, by country.

Variable			Chicken		Pork		Beef		Salmon		Cod		
	Min	Max	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	
United Kingdom	Good Taste	1	7	5.16	1.396	4.50	1.649	5.14	1.612	4.94	1.787	4.96	1.564
	Healthiness	1	7	5.31	1.361	3.82	1.489	3.93	1.438	5.77	1.382	5.56	1.338
	Value for money	1	7	5.25	1.408	4.30	1.464	3.79	1.415	4.12	1.509	4.57	1.456
	Convenience	1	7	5.32	1.435	4.38	1.546	4.34	1.470	4.83	1.500	5.14	1.460
Germany	Availability	1	7	6.18	1.238	5.40	1.533	5.38	1.421	5.11	1.468	5.30	1.466
	Good Taste	1	7	5.61	1.449	4.82	1.644	5.29	1.582	5.51	1.707	4.60	1.937
	Healthiness	1	7	5.34	1.426	3.39	1.413	4.58	1.380	5.86	1.284	5.45	1.576
	Value for money	1	7	5.11	1.454	4.59	1.595	4.49	1.441	4.90	1.445	4.58	1.641
France	Convenience	1	7	5.14	1.498	4.74	1.529	4.42	1.442	4.88	1.468	4.43	1.635
	Availability	1	7	6.20	1.203	6.08	1.458	5.65	1.398	5.21	1.477	4.52	1.765
	Good Taste	1	7	5.04	1.461	4.32	1.595	5.47	1.420	5.42	1.508	4.85	1.542
	Healthiness	1	7	4.98	1.512	3.81	1.500	4.66	1.401	5.39	1.496	5.43	1.440
Sweden	Value for money	1	7	5.03	1.484	4.84	1.642	3.76	1.456	3.99	1.469	4.50	1.535
	Convenience	1	7	5.00	1.429	4.39	1.610	4.85	1.450	4.90	1.451	4.83	1.445
	Availability	1	7	5.93	1.307	5.57	1.552	5.48	1.430	5.15	1.458	5.08	1.541
	Good Taste	1	7	5.71	1.512	5.02	1.691	5.65	1.510	5.44	1.819	4.97	1.812
	Healthiness	1	7	5.47	1.474	3.84	1.454	4.54	1.525	5.90	1.398	5.67	1.407
	Value for money	1	7	5.21	1.544	4.72	1.528	3.83	1.511	4.43	1.601	4.02	1.567
	Convenience	1	7	5.23	1.602	4.72	1.559	4.55	1.544	5.12	1.600	4.80	1.602
	Availability	1	7	6.14	1.387	5.92	1.460	5.62	1.513	5.44	1.545	4.89	1.642

and *availability*. Summary statistics of the ratings are shown in Table 3, and are explored later here.

Analysis

Segmenting the FRL dimensions into consumer groups

The responses to the adapted FRL questions were split into three groups for each country using latent class analysis (LCA). The detailed accounts of the methodology and the estimation of LCA is provided in Onozaka, Hansen and Sørvig (2014); so, it is not repeated here. The three FRL consumer groups are denoted as *Low*, *Mid*, and *High*, characterized by their low, mid, or high mean scores in the lifestyle dimensions. The *High* segment has high means in the FRL dimensions, and so on, except for convenience where segment means are inverted, meaning the *High* segment has a low mean and the *Low* segment the opposite. Based on the segmentation, the *High* segment is interpreted as consumers that have high food involvement. They have a strong interest for food, spend time getting to know the product information, enjoy cooking, and learn about the health and nutritional facets of the food they consume.

The convenience aspect of the food is less important for the *High* consumers, as the preparation of food is seen as less of a chore than for the other segments (Onozaka et al., 2014). In contrast, the *Low* involvement

group values convenience, and shows less interest in the remaining dimensions. They are not very concerned about food or the preparation of it. As the name implies, the *Mid* group is found between the two others having a moderate relationship to food. Onozaka et al. (2014) identified a *Mid2* group in Germany, located between *Mid* and *Low*, but both the German mid groups have been combined for the purpose of this analysis.

The segment sizes are also able to give an indication on the market size for each segment. The segments were found to roughly translate into a quarter of the market for both the *Low* and *High* groups, and half for the *Mid* segment (Onozaka et al., 2014).

Perceptions about meat and fish

The data from this survey allow the determination of the consumer attitudes and perceptions towards chicken, pork, beef, salmon, and cod on these variables. An analysis of variance (ANOVA) was performed following the gathering of the descriptive data, and sorting the data for each of the four countries. A repeated measure one-way ANOVA was used to explore the perception differences within each of the defined FRL groups, comparing the results from the various attributes across protein types in each market. The Wilks' Lambda multivariate test was used to determine significance effects within each FRL group. A standard one-way ANOVA explored whether there are perception differences among the three FRL groups. Upon detection of any between-group differences, Games-Howell post hoc tests were used to determine which groups differed significantly. This post-hoc test does not assume equal variance.

The descriptive data of the consumer perceptions to the various meat types are shown in Table 3. It presents the country means for each of the explored variables. Chicken scores high on all the variables across all countries, only dipping below a mean of 5 (4.98) in one country (France), on a single metric (*healthiness*). Salmon and cod, as expected, score high on the *healthiness* measure, but the means for *availability* tend to be lower than for the other proteins. Pork is rated lowest on most of the variables, excluding availability. Beef does well on *good taste* and *availability*, while suffering in the *healthiness* and *value for money* categories. The remainder of this section explores the perception differences within and between the FRL groups for the five attributes within each country. The analysis shows that within-group differences have Wilks' Lambda $p < 0.000$ for all attributes in each country.

United Kingdom

The one-way repeated measures ANOVA was used to explore the within-group perception differences. The results (Table 4) indicate that there is a

Table 4. United Kingdom means (std. dev.) for perception on different meat types between the various food-lifestyle groups, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

		Low	Mid	High	F(df)
Chicken	Good taste	4.80(1.387)	5.17(1.358)	5.53(1.403)	8.460(2,486)**
	Healthiness	4.76(1.302)	5.30(1.381)	5.74(1.293)	15.898(2,486)**
	Value for money	4.83(1.388)	5.24(1.370)	5.60(1.475)	8.754(2,480)**
	Convenience	4.86(1.413)	5.31(1.471)	5.74(1.300)	11.330(2,479)**
	Availability	5.83(1.369)	6.15(1.314)	6.47(0.934)	7.577(2,478)**
Pork	Good taste	4.45(1.500)	4.43(1.634)	4.68(1.822)	0.994(2,484)
	Healthiness	3.74(1.220)	3.78(1.462)	3.98(1.812)	0.880(2,481)
	Value for money	4.01(1.306)	4.30(1.411)	4.51(1.682)	3.478(2,477)*
	Convenience	4.05(1.257)	4.31(1.515)	4.82(1.745)	7.859(2,475)**
	Availability	5.01(1.486)	5.42(1.506)	5.68(1.599)	5.669(2,475)**
Beef	Good taste	4.80(1.494)	5.16(1.591)	5.39(1.655)	4.012(2,481)*
	Healthiness	3.68(1.234)	3.87(1.395)	4.29(1.578)	5.939(2,481)**
	Value for money	3.79(1.227)	3.74(1.331)	3.87(1.688)	0.326(2,476)
	Convenience	4.02(1.300)	4.31(1.421)	4.68(1.666)	5.901(2,476)**
	Availability	4.96(1.355)	5.47(1.420)	5.61(1.457)	6.784(2,475)**
Salmon	Good taste	4.03(1.722)	5.02(1.733)	5.54(1.770)	22.915(2,484)**
	Healthiness	4.99(1.398)	5.88(1.288)	6.17(1.362)	25.417(2,480)**
	Value for money	3.55(1.392)	4.08(1.453)	4.68(1.546)	17.176(2,476)**
	Convenience	4.01(1.289)	4.82(1.515)	5.47(1.394)	29.398(2,473)**
	Availability	4.41(1.391)	5.15(1.418)	5.59(1.452)	20.222(2,475)**
Cod	Good taste	4.29(1.468)	5.00(1.501)	5.45(1.602)	17.336(2,481)**
	Healthiness	4.90(1.338)	5.59(1.295)	6.05(1.249)	23.372(2,480)**
	Value for money	4.23(1.446)	4.50(1.428)	5.03(1.435)	9.428(2,476)**
	Convenience	4.50(1.414)	5.11(1.458)	5.80(1.300)	24.755(2,476)**
	Availability	4.86(1.480)	5.29(1.467)	5.63(1.426)	8.015(2,476)**

Note. *Indicates the mean difference is significant at $p < 0.05$ based on ANOVA.

**Indicates the mean difference is significant at $p < 0.01$ based on ANOVA.

significant effect within all three FRL groups in all the five qualities examined (see [Figure 1](#)). Taste is one of the main barriers to consumption; the data find that both seafood products are rated significantly lower in *good taste* for the *Low* FRL group, while there are no significant differences in the perception of the terrestrial meats. This taste divide is not found in the *Mid* and *High* FRL groups, where only pork is rated significantly lower than the other meat types.

When looking at *healthiness*, the *Low* group rates both fish products higher than beef and pork, but not significantly healthier than chicken. Here both the *Mid* and *High* FRL groups perceive salmon to be significantly healthier than the terrestrial meats, but the *Mid* group also perceives it to be significantly healthier than cod. Moreover, the *Mid* and *High* groups do not show any significant difference between any of the products in regards to *value for money*, while the *Low* group perceives the value of salmon to be significantly lower than all other products. Cod is rated better in this group, only significantly lower than chicken in *value for money*. The fish products fare well among the *Mid* and *High* groups in *convenience*, perceived significantly more convenient than beef and pork. The *Mid* group see salmon as significantly less convenient than chicken, while the *High* group does not. The *Low* group views cod as significantly more convenient than both pork and salmon, but

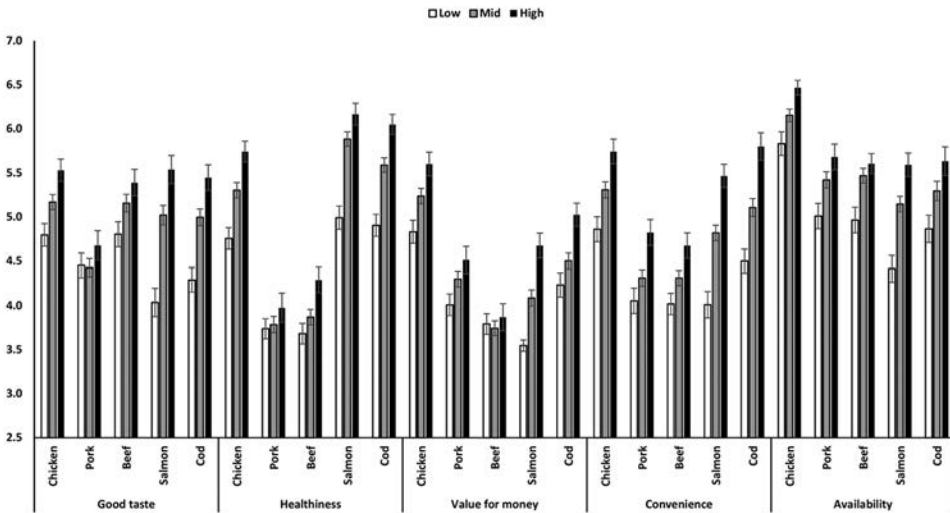


Figure 1. UK FRL groups' attribute means (w/std. error bar) for each meat type, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

shows no significant difference to beef and chicken. Looking at *availability*, the results show that salmon is perceived significantly lower than all other meats. This group views cod as only being lower in availability than chicken. The difference to beef and pork are insignificant. Salmon is still viewed significantly lower, in the *Mid* group, than the terrestrial meats, but cod is only rated significantly lower than chicken. For the *High* group the availability of the seafood products is only significantly lower than chicken, showing that the higher FRL groups views seafood more favorably.

Looking at the between-group differences (presented in [Table 4](#)), the results show significant differences across all qualities (*taste*, *healthiness*, *value for money*, *convenience*, and *availability*) for chicken. The post-hoc tests show significant differences for *good taste* between the *Low* group and both *Mid* and *High* groups, but not between the *Mid* and *High* groups. The same pattern is also true for *value for money*. For *healthiness* and *convenience*, there are significant differences between all three groups. For *availability*, significant differences are found between the *High* group and the two others, but not between *Low* and *Mid* groups. The means show that the *Low* group tends to have lower means across all the attributes, while the *High* groups has the highest means across all groups.

Exploring results from pork shows significant differences between the groups in *value for money*, *convenience*, and *availability*. The post-hoc tests show that the differences are between the *Low* and *High* groups in *value or money*, while differences are not found between *Mid* and *Low* for *convenience*, and *Mid* and *High* for *availability*. The means again show an increase in rating as we move from *Low* involvement to *High* involvement groups.

With beef, group variations are between *Low* and *High* groups in *good taste* and *convenience*, while for *healthiness* the difference between *Mid* and *Low* groups are insignificant. For *availability*, the difference of *Mid* and *High* groups is insignificant. There are no significant differences between groups for value for money.

For the fish proteins, the results for salmon and cod show significant differences between groups in all attributes. The only combination that did not show a significant difference, in salmon, is in *healthiness*, between the *Mid* and *High* groups. Cod displays similar results, but here there are two combinations that do not show any significant difference, between *Low* and *Mid* in *value for money*, and between *Mid* and *High* in *availability*. The mean jump from the *Low* group to the *Mid* and *High* groups is dramatic. This is best illustrated by the jump in the *taste* mean of almost an entire point between *Low* and *Mid* for salmon, and 0.7 for cod.

Germany

In Germany, cod is perceived less favorably than in the other countries, except in the *healthiness* rating. None of the groups views cod highly in *good taste*; the results (see Figure 2) showing it being, in the *Low* group, the only product with a significant difference (negative) to the other protein sources. The *High* group is the only one with a somewhat favorable view of cod, rating it significantly above pork, but significantly lower than both chicken and salmon. The latter did better, with ratings above cod and pork in *good taste*, but insignificantly different to beef and chicken in the *Mid* and *High* FRL groups. The

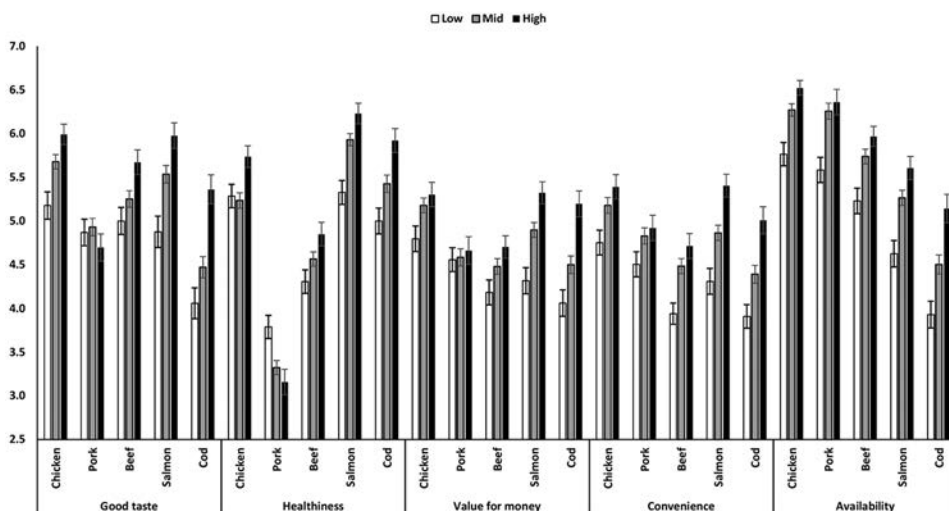


Figure 2. German FRL groups' attribute means (w/std. error bar) for each meat type, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

results for *healthiness* are the same as in the UK: above both beef and pork, but not significantly different to chicken.

Salmon is rated significantly higher than cod in the *Mid* group, but this significance is not present in the *High* group. Here, salmon is rated higher than chicken, while cod is not. In *value for money*, cod fares poorly in the *Low* group, as the only product significantly differing from the others. Cod remains poorly rated in value in the *Mid* and *High* groups, only the *High* group rates cod significantly above another product (beef) in *value for money*. Salmon is perceived better, the *Mid* group rating it above beef, but with no significant difference to pork and chicken. The *High* group also rates salmon significantly above pork. In *convenience*, cod continues to rate lower. In the *Low* group, it is perceived to be less convenient than all other meat types, except for beef (no significant difference). This group does not perceive salmon differently from the terrestrial products for this quality measure. The *Mid* group views cod as the *Low* group but salmon rates below only chicken, above the rest. The *High* group views cod as not significantly different from the other land-based meats, but below salmon. Salmon, for this group, is more convenient than other meat types. The *availability* of cod also is perceived to be lower than salmon in Germany. In both the *Low* and *Mid* groups the fish products are viewed as more difficult to acquire than the other meats, but salmon is still seen as significantly easier to acquire than cod. For the *High* group cod is viewed the same as in the two previous groups, but here the difference between salmon and beef becomes insignificant.

Looking at the between-group differences in Germany (shown in Table 5), we find that, for chicken, perception differences are found in all variables between the food lifestyle groups across all variables. For *convenience*, *availability*, and *good taste* no significant differences are found between the *Mid* and *High* groups, while the remaining groupings show significant differences. In *healthiness*, only between *Low* and *Mid* groups is no significance detected, and in *value for money*, significant differences are only seen between the *Low* and *High* groups. The general trend of the means is similar to the ones seen in the United Kingdom. The ratings tend to be higher for the more involved groups; the only exception is for *healthiness* where the *Low* group views chicken as healthier than the *Mid* group, but the *High* group rates chicken higher than both the other groups.

The results for pork show fewer differences between the groups. Only for *healthiness* and *availability* are any significant differences detected between the groups. In *healthiness* and *availability*, differences are found between all groups except between the *Mid* and *High* ones.

For beef, as with chicken, all attributes have significant between-group differences. In *healthiness* and *value for money*, a group difference is detected between the *Low* and *High* lifestyle groups. For the qualities *convenience* and *availability*, a significant difference is not present only between the

Table 5. Germany means (std. dev.) for perception on different meat types between the various food-lifestyle groups, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

		Low	Mid	High	<i>F(df)</i>
Chicken	Good taste	5.18(1.618)	5.68(1.295)	5.99(1.319)	10.269(2,480)**
	Healthiness	5.29(1.371)	5.23(1.389)	5.74(1.400)	5.847(2,478)**
	Value for money	4.80(1.484)	5.18(1.338)	5.30(1.584)	3.834(2,476)*
	Convenience	4.75(1.424)	5.18(1.437)	5.39(1.584)	5.412(2,473)**
	Availability	5.76(1.351)	6.27(1.118)	6.52(0.947)	13.105(2,475)**
Pork	Good taste	4.87(1.573)	4.93(1.554)	4.70(1.762)	0.890(2,480)
	Healthiness	3.79(1.349)	3.32(1.273)	3.16(1.635)	6.287(2,473)**
	Value for money	4.56(1.392)	4.58(1.552)	4.66(1.787)	0.145(2,473)
	Convenience	4.50(1.440)	4.83(1.450)	4.92(1.638)	2.379(2,469)
	Availability	5.58(1.651)	6.26(1.257)	6.36(1.334)	10.809(2,469)**
Beef	Good taste	5.00(1.581)	5.25(1.491)	5.67(1.608)	5.816(2,476)**
	Healthiness	4.31(1.355)	4.57(1.273)	4.85(1.518)	4.514(2,468)*
	Value for money	4.18(1.453)	4.48(1.389)	4.70(1.455)	3.851(2,473)*
	Convenience	3.94(1.213)	4.48(1.353)	4.71(1.604)	8.931(2,467)**
	Availability	5.23(1.462)	5.74(1.317)	5.97(1.283)	8.765(2,468)**
Salmon	Good taste	4.88(1.833)	5.53(1.577)	5.98(1.645)	12.779(2,474)**
	Healthiness	5.33(1.379)	5.93(1.088)	6.23(1.322)	15.788(2,468)**
	Value for money	4.32(1.503)	4.90(1.340)	5.32(1.430)	14.524(2,469)**
	Convenience	4.31(1.482)	4.86(1.361)	5.40(1.471)	16.721(2,466)**
	Availability	4.63(1.502)	5.27(1.370)	5.61(1.497)	13.231(2,468)**
Cod	Good taste	4.06(1.785)	4.47(1.908)	5.36(1.370)	15.328(2,470)**
	Healthiness	5.00(1.483)	5.43(1.553)	5.92(1.314)	10.323(2,467)**
	Value for money	4.06(1.504)	4.50(1.568)	5.20(1.363)	15.295(2,465)**
	Convenience	3.91(1.340)	4.39(1.591)	5.01(1.290)	13.727(2,462)**
	Availability	3.93(1.534)	4.50(1.709)	5.14(1.493)	14.284(2,465)**

Note. *Indicates the mean difference is significant at $p < 0.05$ based on ANOVA.

**Indicates the mean difference is significant at $p < 0.01$ based on ANOVA.

Mid and *High* groups. For *good taste*, there is no group difference between the *Low* and *Mid* groups, but differences are seen between *High* and *Low*, and *High* and *Mid* groups.

As with the UK market, the perception of fish in Germany varied significantly between food-lifestyle groups for all quality attributes, with only one group comparison, in one attribute, not found to be significant for each of the fish species. For salmon, the sole non-significant result is between the *Mid* and *High* group regarding *healthiness*. For cod, the one comparison not showing significance is in *good taste*, between *Low* and *Mid* food-lifestyle groups, the rest showing significant differences.

France

The French market looks to value seafood higher than the other markets (results presented in Figure 3). Even in the *Low* group, salmon rates significantly higher than pork and cod in *good taste*, with the difference between it, chicken, and beef insignificant. Cod is seen by this group as significantly less tasty than beef and salmon, but the difference from pork and chicken is insignificant. The *Mid* group rate cod lower, only significantly above pork,

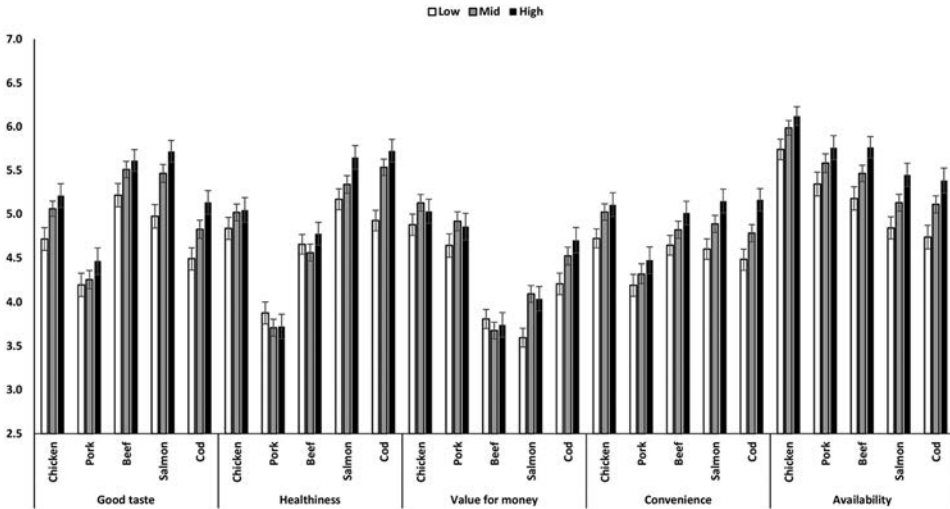


Figure 3. French FRL groups' attribute means (w/std. error bar) for each meat type, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

yet salmon is perceived to have a significantly better flavor than chicken, pork, and cod, but the difference with beef is insignificant.

The *High* group rates salmon in the same manner as the *Mid* Group, but cod is rated slightly higher here with its difference to chicken now being insignificant. Salmon is rated highest in the *Low* group on *healthiness*, albeit not significantly different from their rating of cod and chicken. Cod is not rated significantly healthier than beef in this group. The *Mid* group views cod as the healthiest fish, not significantly healthier than salmon, but healthier than the other meats. Salmon is perceived as healthier than beef and pork, but the difference with chicken is insignificant. For the *High* group both fish species score significantly better than the remaining meat types. Considering *value for money*, the *Low* group rates salmon as the product providing the least *value for money*, significantly below all other products excluding beef (no significance), while cod is found to be significantly lower than chicken and pork, but higher than salmon.

The *High* group rates salmon just as the *Low* group did, while the *Mid* group place salmon significantly higher than beef. This group views cod similar to the *Low* group; with the only difference being it is perceived as providing significantly better value to beef. For the *High* group the significant difference from cod to chicken and pork vanishes, while remaining above salmon and beef. For *convenience* both seafood species are significantly below chicken but above beef and pork among the *Mid* and *High* FRL groups, but cod is seen as more convenient than salmon among the *Mid* consumers. For the *Low* group chicken reigns supreme in *convenience*, while salmon and cod are not significantly different from the remaining terrestrial meat products. Both

the *Low* and *Mid* group perceive the *availability* of the seafood products significantly below the other products, but no difference is found between the two fish species. For the *High* group this perception remains significantly below chicken, but the difference between beef and pork disappears.

Although most of the mean differences found in the United Kingdom and Germany are found to be significant between groups, the results from France diverge somewhat (see Table 6). Particularly in the results for the terrestrial meat types (chicken, pork and beef), there is less significant difference in the perception between the food involvement groups.

Exploring the data, two chicken variables show mean differences, *good taste* and *availability*. In both these, the *Low* and *High* groups are the only groups with significant differences. For beef, the singular difference detected in *availability* is between the *High* and *Low* groups. In pork, none of the lifestyle groups displays significant perception differences for any quality measure.

Although there is little variation in the perception of the terrestrial meat types in the French food lifestyle groups, exploring the seafood proteins shows significant perception differences between the groups in all explored quality measures. Looking at salmon, the variables *healthiness*, *convenience*, and *availability* display significant mean differences between the *Low* and *High*

Table 6. France means (std. dev.) for perception on different meat types between the various food-lifestyle groups, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

		Low	Mid	High	F(df)
Chicken	Good taste	4.72(1.458)	5.06(1.260)	5.21(1.680)	4.178(2,484)*
	Healthiness	4.84(1.399)	5.02(1.393)	5.05(1.724)	0.771(2,476)
	Value for money	4.88(1.359)	5.13(1.389)	5.03(1.686)	1.115(2,478)
	Convenience	4.72(1.210)	5.02(1.353)	5.11(1.652)	2.710(2,475)
	Availability	5.74(1.305)	5.99(1.214)	6.12(1.315)	3.085(2,477)*
Pork	Good taste	4.20(1.481)	4.26(1.520)	4.47(1.797)	1.090(2,476)
	Healthiness	3.88(1.400)	3.71(1.398)	3.72(1.710)	0.548(2,476)
	Value for money	4.64(1.483)	4.92(1.568)	4.86(1.855)	1.130(2,477)
	Convenience	4.20(1.389)	4.32(1.585)	4.48(1.807)	1.025(2,472)
	Availability	5.34(1.504)	5.58(1.549)	5.76(1.666)	2.322(2,471)
Beef	Good taste	5.22(1.474)	5.51(1.358)	5.61(1.523)	2.719(2,479)
	Healthiness	4.66(1.258)	4.56(1.388)	4.78(1.586)	1.004(2,477)
	Value for money	3.81(1.192)	3.68(1.375)	3.74(1.715)	0.325(2,474)
	Convenience	4.64(1.244)	4.82(1.398)	5.01(1.645)	2.191(2,474)
	Availability	5.18(1.472)	5.47(1.346)	5.76(1.491)	5.636(2,473)**
Salmon	Good taste	4.98(1.996)	5.57(1.655)	5.67(1.795)	8.474(2,477)**
	Healthiness	5.54(1.489)	6.02(1.263)	6.05(1.482)	3.663(2,477)*
	Value for money	3.88(1.547)	4.63(1.441)	4.54(1.790)	5.061(2,477)**
	Convenience	4.49(1.593)	5.26(1.519)	5.49(1.577)	4.789(2,473)**
	Availability	4.98(1.529)	5.55(1.517)	5.63(1.594)	5.760(2,471)**
Cod	Good taste	4.49(1.370)	4.83(1.496)	5.14(1.623)	6.159(2,478)**
	Healthiness	4.93(1.314)	5.54(1.343)	5.72(1.598)	11.554(2,477)**
	Value for money	4.21(1.363)	4.52(1.428)	4.70(1.771)	3.529(2,476)*
	Convenience	4.48(1.290)	4.78(1.420)	5.16(1.545)	7.643(2,470)**
	Availability	4.74(1.493)	5.11(1.401)	5.38(1.719)	5.945(2,471)**

Note. *Indicates the mean difference is significant at $p < 0.05$ based on ANOVA.

**Indicates the mean difference is significant at $p < 0.01$ based on ANOVA.

groups. *Good taste* and *value for money* demonstrate significant differences between *Low* and both *High* and *Mid*, but not between the *Mid* and *High* lifestyle groups. The means for France show that the quality differences examined, for the terrestrial meat types, are insignificant for almost all of the quality metrics; however, there are significant between-group differences for all fish attributes. For the fish species, the means increase with higher food involvement, following the pattern seen in the other countries.

Similar to salmon, cod also has significant between-group variabilities across all measured variables. When looking at *good taste*, the detected differences in perception is between the *Low* group and both *Mid* and *High* groups, but the latter two do not differ between themselves. This is also true for *value for money*. For *healthiness*, *convenience*, and *availability* the only significant group differences are between the *Low* and *High* groups.

Sweden

The Swedish within-group results (Figure 4) show that, for *good taste*, the results are similar to the other markets. The *Low* group perceive the taste of seafood significantly below chicken and beef, with cod also scoring significantly below pork and salmon. Cod continues to score low in the *Mid* category, but the salmon rating improves, its difference between chicken and beef becoming insignificant. The *High* group rates fish highest in *taste*, where the analysis finds no significant differences between seafood and terrestrial meats. In *healthiness*, as expected, the results are similar to the other countries. In both *Low* and *High* groups, cod and salmon rate significantly

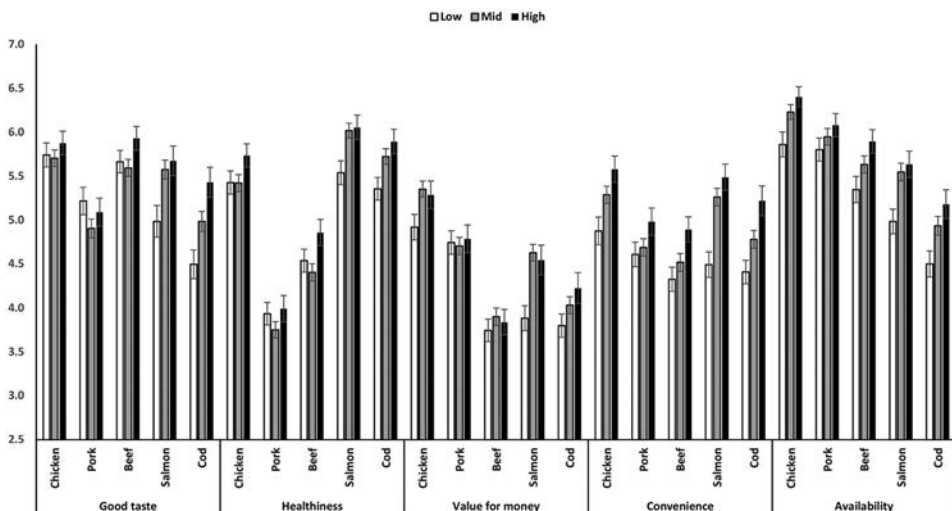


Figure 4. Swedish FRL groups' attribute means (w/std. error bar) for each meat type, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

healthier than pork and beef, but not significantly different from each other or chicken. The *Mid* group sees salmon as significantly healthier than both cod and chicken. Salmon and cod rate below other meat types in the *Low* group on *value for money*.

This group views chicken and pork as products of better value, but they do not significantly differ from beef or each other. The *Mid* group sees chicken as the product that provides the best *value for money*. However, salmon rates higher in value here than in the *Low* group, significantly above beef and cod. The *High* group view salmon similarly, when comparing it to terrestrial meats, but the significant difference to cod is no longer present. The *Low* group shows significant differences in terms of *convenience* between salmon and any other meats, but cod is seen as less convenient than chicken. The *Mid* group sees both chicken and salmon as more convenient than the other meat categories, with no significant difference detected between cod, pork, and beef. Chicken and salmon remain, in the *High* group, perceived as significantly more convenient than beef and pork, but here cod displays no significant difference to any of the other protein sources. The perception of the *availability* of seafood products is significantly lower than the other meat types for the *Low* group. This group views salmon as more available than cod. For cod this remains the same in the *Mid* and *High* group, while the difference between salmon and beef is no longer present in either the *Mid* nor the *High* group.

When looking between FRL groups, Sweden, as does France, shows more divergence in perception between food involvement groups when it comes to fish than the land-based meats (see results presented in Table 7). Chicken exhibits perception differences in *value for money*, *convenience*, and *availability*. The significant group differences are between *Low* and *Mid* groups for *value for money*, while *convenience* and *availability* exhibits significant differences between the *Low* and *High* groups.

As with France, none of the Swedish FRL groups shows any perception differences regarding pork. However, beef exhibits differences in *healthiness*, *convenience*, and *availability*. The *Mid* and *High* groups show a significant perception difference regarding *healthiness*, while the perception differences found for *convenience* and *availability* emerge between *Low* and *High* groups.

When moving on to salmon and cod, as with the other countries, there are significant perception differences between the Swedish food lifestyle groups. For salmon, there are significant variations in all quality metrics. For cod, however, only *value for money* fails to find any significant between-groups differences. The pattern of perception differences for the salmon qualities are consistent. All attributes see significant differences between the perception of the *Low* and both *Mid* and *High* groups, with *Mid* and *High* group differences being insignificant. Cod sees the same pattern for *good taste* and *availability*, but for *healthiness* and *convenience* the difference is between the *Low* and *High* groups.

Table 7. Sweden means (std. dev.) for perception on different meat types between the various food-lifestyle groups, rated on a scale from 1 (*extremely poor*) to 7 (*superior*).

		Low	Mid	High	F(df)
Chicken	Good taste	5.74(1.544)	5.70(1.443)	5.88(1.421)	0.539(2,473)
	Healthiness	5.43(1.465)	5.42(1.456)	5.73(1.402)	1.989(2,458)
	Value for money	4.92(1.612)	5.35(1.386)	5.29(1.668)	3.369(2,460)*
	Convenience	4.88(1.720)	5.29(1.479)	5.58(1.587)	5.888(2,459)**
	Availability	5.86(1.562)	6.23(1.287)	6.40(1.219)	5.067(2,458)**
Pork	Good taste	5.22(1.744)	4.90(1.627)	5.09(1.690)	1.490(2,463)
	Healthiness	3.93(1.407)	3.75(1.392)	3.99(1.581)	1.264(2,453)
	Value for money	4.74(1.469)	4.70(1.471)	4.79(1.663)	0.109(2,457)
	Convenience	4.61(1.525)	4.69(1.489)	4.98(1.620)	1.948(2,451)
	Availability	5.80(1.453)	5.95(1.429)	6.08(1.402)	1.110(2,459)
Beef	Good taste	5.66(1.437)	5.59(1.483)	5.93(1.444)	2.041(2,466)
	Healthiness	4.54(1.432)	4.40(1.500)	4.86(1.582)	3.426(2,458)*
	Value for money	3.74(1.417)	3.90(1.503)	3.84(1.529)	0.432(2,457)
	Convenience	4.33(1.502)	4.52(1.521)	4.89(1.510)	4.205(2,454)*
	Availability	5.35(1.637)	5.63(1.468)	5.89(1.429)	3.867(2,459)*
Salmon	Good taste	4.98(1.996)	5.57(1.655)	5.67(1.795)	5.631(2,465)**
	Healthiness	5.54(1.489)	6.02(1.263)	6.05(1.482)	5.708(2,459)**
	Value for money	3.88(1.547)	4.63(1.441)	4.54(1.790)	9.435(2,456)**
	Convenience	4.49(1.593)	5.26(1.519)	5.49(1.577)	13.856(2,459)**
	Availability	4.98(1.529)	5.55(1.517)	5.63(1.594)	6.636(2,455)**
Cod	Good taste	4.50(1.370)	4.98(1.754)	5.43(1.819)	8.040(2,463)**
	Healthiness	5.36(1.314)	5.72(1.345)	5.89(1.479)	4.646(2,460)*
	Value for money	3.80(1.363)	4.03(1.458)	4.23(1.847)	2.167(2,455)
	Convenience	4.41(1.290)	4.78(1.533)	5.22(1.773)	7.589(2,454)**
	Availability	4.50(1.493)	4.93(1.605)	5.18(1.723)	5.218(2,455)**

Note. *Indicates the mean difference is significant at $p < 0.05$ based on ANOVA.

**Indicates the mean difference is significant at $p < 0.01$ based on ANOVA.

Discussion and conclusions

The purpose of this article is to explore the perception differences found between FRL lifestyle groups and various meat types in each of the markets explored by examining how consumers' perceptions differ between seafood and terrestrial meats. Since the categorization of the lifestyle groups (*Low*, *Mid*, and *High*) was determined by the self-selection of participants in each country, and because each market has different consumption rates of fresh and frozen seafood products, direct comparison between countries is not possible. Therefore, each market can only be analyzed independently. The analysis finds that there are differences between lifestyle groups when it comes to perception between the meat types. Consumers with *Low* food involvement rate seafood products lower across all variables (except *healthiness*). This group views seafood as less tasty, expensive, and inconvenient than the other lifestyle groups. Seafood proteins (salmon and cod) consistently displayed both within- and between-group variations in the quality perceptions explored.

For seafood, chicken seems the natural meat type to compare to as it scores high across most of the variables in all countries and quality measures. The

results from the seafood products show that the consumers are generally aware of the health benefits associated with fish, rating it above the other meat sources. Chicken also scores high in the health metric, not much below salmon and cod. Although any particular health benefits associated with chicken are less often stated, the potential health risk of overconsumption of red meat has been a widely covered issue in recent years, possibly leading to chicken scoring higher simply due to it not being a red meat rather than any specific or quantifiable health attributes available. Meanwhile, pork scores particularly low in the health, even though it is lower in calorie count than beef. This might be because consumers include product types as bacon into this category, lowering the perceived healthiness of the meat variant.

The findings show that perception means are generally higher the more involved the consumers are in food-related lifestyles. This is particularly apparent in the UK and Germany, where the survey consistently found that the perception means, for most meat types, increase from the *Low* group to the *Mid* group, and yet again from the *Mid* to the *High* group. This might be attributed to the idea that groups scoring higher on the food involvement questions might have a more positive attitude to all aspects of food. However, France differs slightly here, where in many cases there were few significant differences in the perceptions of the terrestrial meat types (chicken, pork, and beef). France has a particularly developed food culture, which may be the reason for this observation. Nonetheless, there are consistent perception differences between groups when examining the seafood products. The results indicate the homogeneity only encompasses traditional land-produced meats. Similar results emerge in Sweden, where between-food involvement group variations appear in almost all qualities measures for seafood.

The Swedish perceptions of terrestrial meats are more homogenous between the FRL groups. Examining *good taste*, the *Low* group tends to rate fish lower than the land-based alternatives. This is rarely the case in the *Mid* and *High* groups. These segments rate salmon close to chicken and beef in taste, but also show a preference for salmon over cod. In the United Kingdom, cod is consistently rated on par with salmon, even in the *Low* group. This may be cultural, as fish and chips is a United Kingdom staple available in fast-food restaurants at low cost, where cod is one of the most utilized species. The United Kingdom is also a heavy consumer of frozen fish products, where whitefish and cod are prevalent. The results from the *good taste* category do support taste being a significant barrier for increasing seafood consumption (Altintzoglou et al., 2011; Rortveit & Olsen, 2009), albeit this seems to only be a large issue with the *Low* food involvement group.

Chicken significantly outperformed seafood in *value for money*, *convenience*, and *availability*. The *Mid* and *High* groups show significantly higher measures in these attributes, in all countries, than the *Low* involvement group. As shown in the literature review, consumers in Denmark, Norway, and

Iceland believe seafood to be an expensive product (Altintzoglou et al., 2010). The results from the survey indicate that this is a significant issue with the *Low* involvement group. The survey shows that the *Mid* and *High* groups rate seafood consistently lower than chicken, but they are consistently rated better than beef and often on par with pork in the various markets examined. Thus, the data indicate that price is only a barrier for increased consumption of salmon or cod when in direct competition with chicken.

The only area where both fish species struggle against the other meat types across FRL groups is in *availability*. Although the mean score is high for all meat types, seafood is consistently below the terrestrial meats in this attribute. The data does not indicate whether this is because fresh seafood is seen as less available than fresh terrestrial meat products, but this could be the case. This cannot be discerned from the data presented in this article, but it is possible that it may be influenced by the different FRL groups' shopping habits. Consumers with low food involvement may purchase their food at retailers with less of an emphasis on seafood. Additionally, the rating data in this study does not differentiate between frozen and fresh products. This means the participants had to make this distinction, if at all, on their own. As certain markets are larger consumers of fresh fish, yet others consume higher amounts of frozen seafood products, a natural distinction between the FRL groups might be present. The *Low* involvement group might lean towards frozen products, as they are cheaper, while the *High* involvement group might prefer fresh seafood. If the low group purchase frozen food from retailers that stock lower quality seafood products it could influence the groups lower perception on taste. Because they would be exposed to lower quality seafood products. Exploring this differentiation is important in future research to understand perception differences and the potential consumption barriers for seafood.

The analysis demonstrates the importance of taking into account the market segment one is after when attempting to increase seafood consumption. The *Low* FRL group consistently rate seafood lower than terrestrial meat products for many attributes in all the explored markets. This indicates that seafood might not be viewed as a desirable substitute to meat products in this group. If the goal is to increase consumption of seafood in the *Low* involvement groups, the aim would have to be to deliver products that increase the perceived *taste* and *convenience* perceptions. Among the most attractive options would be providing value-added products that are easily prepared, as *convenience* is the attribute valued the most by consumers with *Low* food involvement.

On the other hand, volume-wise, the *Mid* and *High* segment make-up three quarters of each market, which shows that both cod and salmon compare very favorably to beef and pork in most measures for the majority of the sample. As the demand for seafood is projected to increase (Food and Agricultural

Organization of the United Nations, 2014) the major challenge going forward lies with being able to compete with land-based meat products through improved availability and providing better value to the consumers. These challenges can be met more suitably, in part, by aquacultured species, due to the higher degree of control over the production and distribution processes. There are some concerns raised regarding the production methods associated with aquaculture, but a recent study in Norway found negative media coverage to not influence the demand for salmon. The only media coverage Liu et al. (2016) found to have an effect on demand is food recipes with salmon, but this increases the demand for salmon.

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References

- Abate, T. G., Nielsen, R., & Tveterås, R. (2016). Stringency of environmental regulation and aquaculture growth: A cross-country analysis. *Aquaculture Economics & Management*, 20 (2), 201–221. doi:10.1080/13657305.2016.1156191
- Altintzoglou, T., Birch Hansen, K., Valsdottir, T., Øyvind Odland, J., Martinsdóttir, E., Brunsø, K., & Luten, J. (2010). Translating barriers into potential improvements: The case of new healthy seafood product development. *Journal of Consumer Marketing*, 27 (3), 224–235. doi:10.1108/07363761011038293
- Altintzoglou, T., Vanhonacker, F., Verbeke, W., & Luten, J. (2011). Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain. *Aquaculture International*, 19 (3), 475–488. doi:10.1007/s10499-010-9363-2
- Anderson, Jr, W. T., & Golden, L. L. (1984). Lifestyle and psychographics: A critical review and recommendation. *Advances in Consumer Research*, 11 (1), 405–411.
- Asche, F. (2008). Farming the sea. *Marine Resource Economics*, 23 (4), 527–547. doi:10.1086/mre.23.4.42629678
- Asche, F., Bellemare, M. F., Roheim, C., Smith, M. D., & Tveteras, S. (2015a). Fair enough? Food security and the international trade of seafood. *World Development*, 67, 151–160. doi:10.1016/j.worlddev.2014.10.013
- Asche, F., Chen, Y., & Smith, M. D. (2015b). Economic incentives to target species and fish size: Prices and fine-scale product attributes in Norwegian fisheries. *ICES Journal of Marine Science: Journal du Conseil*, 72 (3), 733–740. fsu208. doi:10.1093/icesjms/fsu208

- Asche, F., Larsen, T. A., Smith, M. D., Sogn-Grundvåg, G., & Young, J. A. (2015c). Pricing of eco-labels with retailer heterogeneity. *Food Policy*, 53, 82–93. doi:10.1016/j.foodpol.2015.04.004
- Askegaard, S., & Brunso, K. (1999). Food-related life styles in Singapore: Preliminary testing of a Western European research instrument in Southeast Asia. *Journal of Euromarketing*, 7 (4), 65–86. doi:10.1300/j037v07n04_04
- Bang, H. O., & Dyerberg, J. (1980). Lipid metabolism and ischemic heart disease in Greenland Eskimos. In H. H. Draper (Ed.), *Advances in nutritional research* (pp. 1–22). New York, NY: Springer.
- Bronnmann, J., Ankamah-Yeboah, I., & Nielsen, M. (2016a). Market integration between farmed and wild fish: Evidence from the whitefish market in Germany. *Marine Resource Economics*, 31 (4), 421–432. doi:10.1086/687929
- Bronnmann, J., & Asche, F. (2016b). The value of product attributes, brands and private labels: An analysis of frozen seafood in Germany. *Journal of Agricultural Economics*, 67 (1), 231–244. doi:10.1111/1477-9552.12138
- Brunso, K., & Grunert, K. G. (1995). Development and testing of a cross-culturally valid instrument: food-related life style. *Advances in Consumer Research*, 22 (1), 475–480.
- Brunso, K., Grunert, K. G., & Bredahl, L. (1996). An analysis of national and cross-national consumer segments using the food-related lifestyle instrument in Denmark, France, Germany and Great Britain. Aarhus: The Aarhus School of Business. MAPP Working Paper No. 35.
- Brunso, K., Scholderer, J., & Grunert, K. G. (2004a). Closing the gap between values and behavior—a means–end theory of lifestyle. *Journal of Business Research*, 57 (6), 665–670. doi:10.1016/s0148-2963(02)00310-7
- Brunso, K., Scholderer, J., & Grunert, K. G. (2004b). Testing relationships between values and food-related lifestyle: Results from two European countries. *Appetite*, 43 (2), 195–205. doi:10.1016/j.appet.2004.05.001
- Brunso, K., Verbeke, W., Ottar Olsen, S., & Fruensgaard Jeppesen, L. (2009). Motives, barriers and quality evaluation in fish consumption situations: Exploring and comparing heavy and light users in Spain and Belgium. *British Food Journal*, 111 (7), 699–716. doi:10.1108/00070700910972387
- Burger, J., & Gochfeld, M. (2009). Perceptions of the risks and benefits of fish consumption: Individual choices to reduce risk and increase health benefits. *Environmental Research*, 109 (3), 343–349. doi:10.1016/j.envres.2008.12.002
- Carlucci, D., Nocella, G., De Devitiis, B., Viscecchia, R., Bimbo, F., & Nardone, G. (2015). Consumer purchasing behaviour towards fish and seafood products. Patterns and insights from a sample of international studies. *Appetite*, 84, 212–227. doi:10.1016/j.appet.2014.10.008
- Castellini, C., Berri, C., Le Bihan-Duval, E., & Martino, G. (2008). Qualitative attributes and consumer perception of organic and free-range poultry meat. *World's Poultry Science Journal*, 64 (04), 500–512. doi:10.1017/s0043933908000172
- de Boer, M., McCarthy, M., Cowan, C., & Ryan, I. (2004). The influence of lifestyle characteristics and beliefs about convenience food on the demand for convenience foods in the Irish market. *Food Quality and Preference*, 15 (2), 155–165. doi:10.1016/s0950-3293(03)00054-5
- Drinkwater, K. F. (2005). The response of Atlantic cod (*Gadus morhua*) to future climate change. *ICES Journal of Marine Science: Journal du Conseil*, 62 (7), 1327–1337. doi:10.1016/j.icesjms.2005.05.015
- European Food Safety Authority (EFSA) (2014) Scientific Opinion on health benefits of seafood (fish and shellfish) consumption in relation to health risks associated with exposure to methylmercury. *EFSA Journal*, 12 (7), 3761.

- Fang, C. H., & Lee, H. J. (2009). Food-related lifestyle segments in Taiwan: Application of the food-related lifestyle instrument. *American Journal of Applied Sciences*, 6 (12), 2036–2042. doi:10.3844/ajassp.2009.2036.2042
- Food and Agriculture Organization of the United Nations (FAO). (2014). *The state of world fisheries and aquaculture (SOFIA): Opportunities and Challenges*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Grimshaw, K., Miller, R.K., Palma, M.A., & Kerth, C.R. (2014). Consumer perception of beef, pork, lamb, chicken, and fish. *Meat Science*, 96 (1), 443–444.
- Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector—A review. *Meat Science*, 66 (2), 259–272. doi:10.1016/s0309-1740(03)00130-x
- Grunert, K. G., Brunsø, K., Bredahl, L., & Bech, A. C. (2001). Food-related lifestyle: A segmentation approach to European food consumers. In Frewer et. al (Ed.) *Food, people and society* (pp. 211–230). Berlin: Springer Berlin Heidelberg.
- Grunert, K. G., Perrea, T., Zhou, Y., Huang, G., Sørensen, B. T., & Krystallis, A. (2011). Is food-related lifestyle (FRL) able to reveal food consumption patterns in non-Western cultural environments? Its adaptation and application in urban China. *Appetite*, 56 (2), 357–367. doi:10.1016/j.appet.2010.12.020
- Kahle, L. R., & Kennedy, P. (1989). Using the list of values (LOV) to understand consumers. *Journal of Consumer Marketing*, 6 (3), 5–12.
- Kaynak, E., & Kara, A. (2001). An examination of the relationship among consumer lifestyles, ethnocentrism, knowledge structures, attitudes and behavioural tendencies: A comparative study in two CIS states. *International Journal of Advertising*, 20 (4), 455–482.
- Kobayashi, M., Msangi, S., Batka, M., Vannuccini, S., Dey, M. M., & Anderson, J. L. (2015). Fish to 2030: The role and opportunity for aquaculture. *Aquaculture Economics & Management*, 19 (3), 282–300. doi:10.1080/13657305.2015.994240
- Kucukemiroglu, O. (1999). Market segmentation by using consumer lifestyle dimensions and ethnocentrism: An empirical study. *European Journal of Marketing*, 33 (5/6), 470–487. doi:10.1108/03090569910262053
- Liu, P., Lien, K., & Asche, F. (2016). The impact of media coverage and demographics on the demand for Norwegian salmon. *Aquaculture Economics & Management*, 20 (4), 342–356. doi:10.1080/13657305.2016.1212126
- Mozaffarian, D., & Rimm, E. B. (2006). Fish intake, contaminants, and human health: Evaluating the risks and the benefits. *JAMA*, 296 (15), 1885–1899. doi:10.1001/jama.296.15.1885
- Myrland, Ø., Trondsen, T., Johnston, R. S., & Lund, E. (2000). Determinants of seafood consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption. *Food Quality and Preference*, 11 (3), 169–188. doi:10.1016/s0950-3293(99)00034-8
- Neale, E. P., Nolan-Clark, D., Probst, Y. C., Batterham, M. J., & Tapsell, L. C. (2012). Comparing attitudes to fish consumption between clinical trial participants and non-trial individuals. *Nutrition & Dietetics*, 69 (2), 124–129. doi:10.1111/j.1747-0080.2012.01585.x
- Nesheim, M. C., & Yaktine, A. L. (Eds.). (2007). *Seafood choices: balancing benefits and risks*. Washington, DC: National Academies Press.
- Nie, C., & Zepeda, L. (2011). Lifestyle segmentation of US food shoppers to examine organic and local food consumption. *Appetite*, 57 (1), 28–37. doi:10.1016/j.appet.2011.03.012
- Onozaka, Y., Hansen, H., & Sørvig, A. (2014). Consumer product perceptions and salmon consumption frequency: The role of heterogeneity based on food lifestyle segments. *Marine Resource Economics*, 29 (4), 351–374. doi:10.1086/678928
- Onozaka, Y., Hansen, H., & Tveterås, R. (2012). Salmon's position among consumers. *Global Aquaculture Advocate*, 15 (5), 68–70.

- Onozaka, Y., & McFadden, D. T. (2011). Does local labeling complement or compete with other sustainable labels? A conjoint analysis of direct and joint values for fresh produce claim. *American Journal of Agricultural Economics*, 93 (3), 693–706. doi:10.1093/ajae/aar005
- O’Sullivan, C., Scholderer, J., & Cowan, C. (2005). Measurement equivalence of the food related lifestyle instrument (FRL) in Ireland and Great Britain. *Food Quality and Preference*, 16 (1), 1–12. doi:10.1016/j.foodqual.2003.12.002
- Pieniak, Z., Verbeke, W., Olsen, S. O., Hansen, K. B., & Brunsø, K. (2010). Health-related attitudes as a basis for segmenting European fish consumers. *Food Policy*, 35 (5), 448–455. doi:10.1016/j.foodpol.2010.05.002
- Pieniak, Z., Verbeke, W., Scholderer, J., Brunsø, K., & Olsen, S. O. (2007). European consumers’ use of and trust in information sources about fish. *Food Quality and Preference*, 18 (8), 1050–1063. doi:10.1016/j.foodqual.2007.05.001
- Roheim, C. A., Gardiner, L., & Asche, F. (2007). Value of brands and other attributes: Hedonic analysis of retail frozen fish in the UK. *Marine Resource Economics*, 22 (3), 239–253. doi:10.1086/mre.22.3.42629557
- Roheim, C. A., Sudhakaran, P. O., & Durham, C. A. (2012). Certification of shrimp and salmon for best aquaculture practices: Assessing consumer preferences in Rhode Island. *Aquaculture Economics & Management*, 16 (3), 266–286. doi:10.1080/13657305.2012.713075
- Rortveit, A. W., & Olsen, S. O. (2009). Combining the role of convenience and consideration set size in explaining fish consumption in Norway. *Appetite*, 52 (2), 313–317. doi:10.1016/j.appet.2008.11.001
- Russell, C. G., & Cox, D. N. (2003). A computerised adaptation of the repertory grid methodology as a useful tool to elicit older consumers’ perceptions of foods. *Food Quality and Preference*, 14 (8), 681–691. doi:10.1016/s0950-3293(03)00060-0
- Russell, C. G., & Cox, D. N. (2004). Understanding middle-aged consumers’ perceptions of meat using repertory grid methodology. *Food Quality and Preference*, 15 (4), 317–329. doi:10.1016/s0950-3293(03)00073-9
- Scholderer, J., Brunsø, K., Bredahl, L., & Grunert, K. G. (2004). Cross-cultural validity of the food-related lifestyles instrument (FRL) within Western Europe. *Appetite*, 42 (2), 197–211. doi:10.1016/j.appet.2003.11.005
- Standal, D., & Utne, I. B. (2007). Can cod farming affect cod fishing? A system evaluation of sustainability. *Marine Policy*, 31 (4), 527–534. doi:10.1016/j.marpol.2006.12.003
- Tomek, W. G., & Kaiser, H. M. (2014). *Agricultural product prices*. Ithaca, NY: Cornell University Press.
- Torrissen, O., Jones, S., Asche, F., Guttormsen, A., Skilbrei, O. T., Nilsen, F., ... Jackson, D. (2013). Salmon lice—impact on wild salmonids and salmon aquaculture. *Journal of Fish Diseases*, 36 (3), 171–194. doi:10.1111/jfd.12061
- Tveterås, S., Asche, F., Bellemare, M. F., Smith, M. D., Guttormsen, A. G., Lem, A., ... Vannuccini, S. (2011). Fish is food—the FAO’s fish price index. *PLoS One*, 7 (5), e36731. doi:10.1371/journal.pone.0036731
- Uchida, H., Onozaka, Y., Morita, T., & Managi, S. (2014). Demand for ecolabeled seafood in the Japanese market: A conjoint analysis of the impact of information and interaction with other labels. *Food Policy*, 44, 68–76. doi:10.1016/j.foodpol.2013.10.002
- Verbeke, W., Sioen, I., Brunsø, K., De Henauw, S., & Van Camp, J. (2007a). Consumer perception versus scientific evidence of farmed and wild fish: Exploratory insights from Belgium. *Aquaculture International*, 15 (2), 121–136. doi:10.1007/s10499-007-9072-7
- Verbeke, W., Vanhonacker, F., Sioen, I., Van Camp, J., & De Henauw, S. (2007b). Perceived importance of sustainability and ethics related to fish: A consumer behavior perspective. *Ambio*, 36 (7), 580–585. doi:10.1579/0044-7447(2007)36[580:piosae]2.0.co;2

- Verbeke, W., Vermeir, I., & Brunsø, K. (2007c). Consumer evaluation of fish quality as basis for fish market segmentation. *Food Quality and Preference*, 18 (4), 651–661. doi:[10.1016/j.foodqual.2006.09.005](https://doi.org/10.1016/j.foodqual.2006.09.005)
- Welch, A., Lund, E., Amiano, P., Dorransoro, M., Brustad, M., Kumle, M., ... Jansson, J. (2002). Variability of fish consumption within the 10 European countries participating in the European investigation into cancer and nutrition (EPIC) study. *Public Health Nutrition*, 5 (6b), 1273–1285. doi:[10.1079/phn2002404](https://doi.org/10.1079/phn2002404)
- Wycherley, A., McCarthy, M., & Cowan, C. (2008). Speciality food orientation of food related lifestyle (FRL) segments in Great Britain. *Food Quality and Preference*, 19 (5), 498–510. doi:[10.1016/j.foodqual.2008.02.006](https://doi.org/10.1016/j.foodqual.2008.02.006)