

Kapittel 16

Consumer preferences for cod fillet determined by conjoint analysis

An exploratory study with Norwegian consumers

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SAMMENDRAG Denne studien undersøker forbrukerpreferanser for torskefilet. Adaptiv conjoint-analyse ble brukt til å analysere viktige produktattributter. Informasjon om holdninger, subjektiv kunnskap, forbruk av fisk, og forventninger til smak og kvalitet ble også samlet inn. Pris, opprinnelsesland, utsalgssted og tilstand er de viktigste produktattributtene. Alder er positivt forbundet med holdninger og kjøpssannsynlighet. Resultatene kan brukes i produktutvikling.

ABSTRACT This study examines consumer preferences for cod fillet. Adaptive conjoint analysis was used to analyze important product attributes. Information on consumer attitudes, subjective knowledge, consumption behavior, and expectations to taste and quality was also collected. Price, country of origin, place of purchase and condition are the most important attributes. Age is positively related to attitudes and purchase likelihood. Results can be used for product development purposes.

NØKKEWORD Forbrukerpreferanser | torskefilet | kvalitet | kjøpskriterier

REMARKS

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INTRODUCTION

The selection of processed fish available to consumers in Norwegian retailing has increased considerably over the recent years. Pre-packed fresh or thawed (chilled) fillet products are largely responsible for this growth (see Figure 16.1). Despite this, the Norwegian Seafood Council (NSC) observes a significant decline in fish consumption in general (NSC, 2017). Given the importance of the fish industry to the Norwegian economy, it is important to understand the drivers of consumer preferences for cod fillets to help stem this decline.

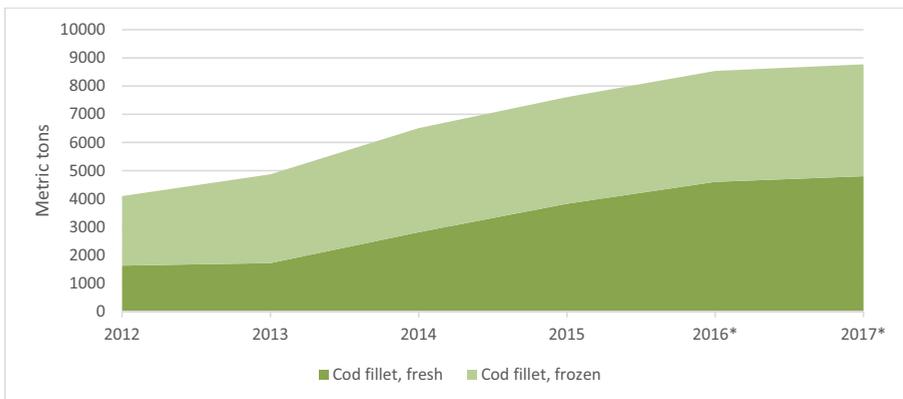


FIGURE 16.1 Volume in metric tons of fresh and frozen cod fillets in Norwegian supermarkets (2012–2017). * is forecasted volume. Source: Flesland Markedsinformasjon.

In addition to consumer preferences, a number of consumer traits related to fish consumption have been identified. A recent review on consumer purchasing behavior towards fish identifies preserving method as an important quality attribute (Carlucci et al., 2015). Several studies confirm that fresh is considered superior to frozen fish. In a study of French consumers, Altintzoglou, Heide & Carlehög (2014) found that the quality of fresh cod fillets is perceived superior to other preserving methods across three consumer segments. Perceived good quality is the most important factor influencing Norwegian consumers' buying behavior

when it comes to fish fillet products, another study found (Altintzoglou & Heide, 2016). Frozen fish is often preferred for its convenience, ready availability and lower price (Carlucci et al., 2015). Previous studies have shown that consumer convenience orientation negatively affects fish consumption (e.g. Rortveit & Olsen, 2009), and that infrequent fish eaters emphasize the importance of convenience in preparation of food (Nystrand, 2015). Pre-packed fillet products respond well to the demand for convenient, ready-to-use food, and category volume growth indicates consumer acceptance.

Attitude towards eating fish is associated with behavioral intention and is often used as a proxy for sensory perception (Carlucci et al., 2015). Attitudes are evaluations of objects that summarize relevant information about those objects (Aikman & Crites, 2007). Studies have found a strong positive link between attitudes and consumption (Nystrand, 2015; Olsen, 2003; Verbeke & Vackier, 2005). Hence, we expect that positive attitudes towards cod should lead to higher purchase likelihood and purchase frequency.

Knowledge about fish affects many aspects of fish consumption. In their review, Carlucci et al. (2015) point to positive links between knowledge and attitude, knowledge and consumption frequency, and knowledge and confidence in evaluating freshness. Most consumers have difficulties assessing the freshness of fish and often rely on extrinsic cues such as price and labelling. Subjective knowledge, i.e. what individuals perceive that they know (Brucks, 1985), is previously found to influence consumption (Pieniak, Verbeke & Scholderer, 2010). Therefore, we expect that higher subjective knowledge about fish should lead to higher purchase likelihood and purchase frequency.

Also, fish consumption is closely related to age (Myrland, Trondsen, Johnston & Lund, 2000; Olsen, 2003). It is well known that younger (vs. older) people consume less (vs. more) fish. Thus, we investigate age differences in attitude towards eating cod, subjective knowledge about fish and consumption behavior.

As implied by the above, this study aims to investigate consumer preferences and expectations towards cod fillets, and to explore some drivers of consumption behavior. To the authors' knowledge this is a first attempt to investigate consumer preferences for cod fillets, with an emphasis on storage condition, by applying adaptive conjoint analysis on a Norwegian sample. The next section will detail the multi-method approach we used in our study, followed by a presentation of results and a discussion of the implications of our findings. After this, we will provide some concluding remarks.

MATERIAL AND METHODS

FOCUS GROUPS

Two focus group interviews were carried out in June 2015 at a central location in Ålesund, Norway. A convenience sample of 16 people (2 x 8) participated, aged between 24 and 51 years ($M = 40.3$, $SD = 12.1$). The focus group sessions were comprised of four parts: i) introduction and registering of individual characteristics (e.g. age, household size, fish consumption frequency), ii) sensory evaluation of raw cod fillet, iii) sensory evaluation of cooked cod fillet, and iv) questioning and discussion (e.g. knowledge about and use of frozen at sea cod fillet, factors influencing purchase decision). Frozen at sea cod fillets were of special interest as a relatively novel product in Norwegian retailing. For the parts ii) and iii), participants were shown 2 x 2 cod fillets (frozen at sea and fresh cod) and given the task to choose which one they preferred in raw and cooked condition, respectively. Part iv) engaged participants in discussions about their level of knowledge of fish, the concept of frozen at sea, preferences for storage conditions and fish buying behavior. The focus group sessions were conducted by a moderator and an assistant taking notes of the discussions. The use of focus groups allowed us to gain deeper insight into consumer preferences that we then incorporated into the following quantitative design.

QUESTIONNAIRE STUDY

The questionnaire data was collected by Norstat consumer panel (Oslo, Norway) in December 2016. In step 1, adaptive conjoint analysis (ACA) was applied to determine consumers' evaluation of product attribute levels and to estimate relative utilities, or preferences, associated with selected product attributes. ACA was first introduced in 1987 as an innovative approach to quantification of consumers' preference structures (Huber, Wittink, Fiedler, & Miller, 1991). The term «adaptive» refers to the customization of the interview (questionnaire) to each respondent, i.e. the procedure adapts questioning based on respondents' answers (Soutar & Turner, 2002). ACA's adaptive procedure provides a way of studying large numbers of attributes and levels (for a thorough presentation of ACA, see Sawtooth Software, 2007). Conjoint analysis has been used to study consumer preferences for e.g. iced coffee (Asioli, Næs, Granli, & Almli, 2014), packaging of fresh cod (Heide & Olsen, 2017), and alternative types of egg (Mesías, Martínez-Carasco, Martínez, & Gaspar, 2011). Other examples include application into medical care (Beusterien, Dziekan, Flood, Harding, & Jordan, 2005; Fraenkel, Bodardus, & Wittink, 2001) and non-food fields of marketing research (e.g. Soutar & Turner, 2002).

The attributes included in the present study were: product format, condition, size, origin, packaging and place of purchase, in addition to price. Product attributes and associated levels were determined by in-store and online investigation of cod fillet products available to consumers, as well as a short literature review. ACA assumes that each attribute is defined by various levels, which refer to a range of plausible estimates for each attribute. For example, the levels for the attribute condition were: fresh, frozen at sea, frozen, and thawed. This study consisted of six product attributes in a 5 x 5 x 5 x 5 x 4 x 4 design. Table 1 presents the 28 levels of choice sets used in the study. In addition, choice sets included price, varying between 90 NOK/kg to 170 NOK/kg. ACA focuses on the attributes that are most relevant to each respondent and customizes the choice sets presented, resulting in a reasonable number of choice sets for the respondent to consider.

TABLE 16.1 Product attributes and associated levels.

Format	Condition	Size	Country of origin	Packaging	Place of purchase
Fillet w/ skin	Fresh	400 g	Norway	Vacuum	Fishmonger
Fillet skinless	Frozen at sea	600 g	Denmark	Bag	Local store
Fillet portion w/ skin	Frozen	800 g	Russia	Carton	Supermarket
Fillet portion skinless	Thawed	1000 g	Lithuania	Paper	Online
		2000 g	China	Plastic tray	Fishing boat

The ACA section involved two sets of questions. First, respondents were asked to rank the attractiveness of each attribute level on a 7-point scale from (1) «Not attractive» to (7) «Extremely attractive». Second, respondents were asked a set of questions asking them to choose one option from a pair (paired comparisons). Basically, two products of cod fillets with different attribute levels are presented side-by-side, and the respondents are asked which one they would prefer on a 9-point scale, ranging from «Strongly prefer the left alternative» to «Strongly prefer the right alternative.»

In step 2, consumers answered questions relating to individual characteristics. First, purchase likelihood of cod fillet was measured on a 7-point Likert scale ranging from (1) «Very unlikely» to (7) «Very likely». Next, fish consumption behavior was measured by the following three items on a 9-point scale ranging

from (1) «Never» to (9) «Daily or almost daily»: «How often do you eat cod for dinner at home?»; «How often do you buy fresh cod fillet?»; and «How often do you buy frozen cod fillet?».

Following Olsen (2003), attitudes towards eating cod was measured by the following four statements on a 7-point Likert scale ranging from (1) «Totally disagree» to (7) «Totally agree»: «It is wise to eat cod for dinner»; «Cod tastes good»; «Cod for dinner gives me a pleasant feeling»; and «I feel very satisfied when I have cod for dinner».

Subjective knowledge about fish was measured by five statements on a 7-point Likert scale from (1) «Totally disagree» to (7) «Totally agree», following Altintzoglou et al. (2014). The statements were: «I feel that I know a lot about fish»; «Compared to an average person, I know a lot about fish»; «Compared to my friends, I know a lot about fish»; «I have a lot of knowledge about how to prepare fish for dinner»; and «I have a lot of knowledge about how to evaluate the quality of fish». These statements cover both individual knowledge about fish (in general) and knowledge about the evaluation of fish quality. Knowledge about how to evaluate fish quality influences behavior and attitudes (Heide & Olsen, 2017).

Following Altintzoglou et al. (2014), consumer expectations about the quality and taste of cod fillets under four different storage conditions was measured. Respondents were faced with the following four questions: «What expectations to quality and taste do you have towards cod fillet in the frozen-goods counter?»; «What expectations to quality and taste do you have towards cod fillet in the frozen-goods counter labelled ‘Frozen at sea’?»; «What expectations to quality and taste do you have towards cod fillet in the refrigerating case labelled ‘Thawed’?»; and «What expectations to quality and taste do you have towards cod fillet in the refrigerating case labelled ‘Fresh’?». Responses to each question were made on two 7-point scales, one referring to quality and one regarding taste, ranging from (1) «Very poor» to (7) «Very good».

Finally, participants were asked four questions about sociodemographic characteristics, namely household size, number of children under the age of 18 years, household annual income, and education. Norstat provided respondents’ age and gender.

STATISTICAL ANALYSIS

All analyses were conducted using SPSS version 24. The level of significance is .05. Attitude measures and measures of subjective knowledge were subjected to principal components analysis (PCA) with Varimax rotation and Kaiser Normali-

zation. All four attitude items loaded on a single component (coefficients above .30 and Kaiser-Meyer-Olkin value of .84). Bartlett's test of sphericity reached statistical significance, thus supporting the factorability of the correlation matrix. Consequently, a composite index Attitude (eigenvalue = 3.32) was computed as the mean of the four item scores ($\alpha = .93$). Likewise, all five items measuring subjective knowledge about fish loaded on a single component, Kaiser-Meyer-Olkin value of .90 and a statistical significant Bartlett's Test of Sphericity. A composite index Subjective knowledge (eigenvalue = 4.03) was made ($\alpha = .94$).

Oneway ANOVA analyses were run to examine differences in purchase likelihood and consumption behavior by age. Multiple regression analyses examined the ability of subjective knowledge and attitude to predict purchase likelihood and consumption behavior.

RESULTS AND DISCUSSION

FOCUS GROUP INTERVIEWS

Participants reported to eat fish on average 1–2 times a week, varying between one time every other week to almost every day. Average household size was four, ranging from two to six family members.

Six of the 16 participants chose frozen at sea cod fillet as their preferred product presented in raw condition, while five participants preferred frozen at sea cod fillet in cooked condition. In the following discussion, participants explained that the frozen at sea cod fillet (in raw condition) had a too perfect appearance, making them question its naturalness. Norwegian consumers emphasize naturalness as one of the most important attributes of seafood (Olsen, Tuu, & Grunert, 2017), and perceived naturalness of food is crucial to consumer acceptance (Román, Sánchez-Siles, & Siegrist, 2017). While several were not familiar with frozen at sea they all responded favorably when told about its production method following completion of the choice tasks. The moderator introduced the participants to some facts about frozen at sea, e.g. that the fillets are produced and quick-frozen to below -20 degrees Celsius within few hours after catching.

Under discussion about possible measures to differentiate frozen at sea from conventional frozen fish or even fresh fish, participants opened by stating that «frozen fish is frozen fish», implying inferiority in comparison to fresh fish. Ambiguously, most of the participants agreed that self-caught fish that is subsequently frozen at home should be considered as fresh fish. Participants suggested that frozen at sea products also should be made available in smaller units to fit in their freezers at home. An important take home message for producers of

frozen at sea fish is to communicate benefits to consumers such as production method and Norwegian origin. Additionally, information about the fishing vessel, fishing grounds, at home preparation and recipes as well as a personal greeting from the skipper are considered to generate preference to consumers.

QUESTIONNAIRE STUDY

Sample characteristics

The sample includes 249 consumers (50.6 % male, 49.4 % female), aged between 18 and 84 years (M = 49.8, SD = 17.0). The majority of consumers (65.9 %) live in small households (1–2 people), have higher education and a household annual income below NOK 1 million. Table 16.2 reports on the sociodemographic characteristics of the participants.

TABLE 16.2 Sample characteristics (N=249).

Category	(%)	Category	(%)
<i>Gender</i>		<i>No. of children under 18</i>	
Female	49.4	1 or 2	65.9
Male	50.6	3 or more	34.1
<i>Age</i>		<i>Education level</i>	
18–25	8.8	Primary and lower secondary	3.6
26–35	15.3	Upper secondary	32.5
36–45	16.5	Higher education ≤ 4 years	41.4
46–55	19.3	Higher education ≥ 5 years	22.5
56–65	16.9	<i>Household income (NOK/year)</i>	
>65	23.3	< 600,000	43.2
<i>Household size</i>		600,000 – 999,999	34.2
1 or 2	65.9	1,000,000 – 1,199,999	11.6
3 or 4	25.6	1,200,000 or more	11.1
5 or more	8.5		

Step 1: ACA ratings

Table 16.3 reports the part-worth utility values for each attribute level and the relative importance of each attribute (excl. Price). Results show that consumers rate country of origin and price to be the two most important attributes (relative importance of 18.34 % and 18.32 %, respectively). Next follow place of purchase (15.76 %) and condition (15.73 %), size (12.32 %), packaging (9.97 %) and format (9.57 %).

Consumers in various countries, including Norway, perceive fish as being expensive and price of fish is considered one of the main barriers to consumption (Altintzoglou et al., 2010; Brunso, Verbeke, Olsen, & Jeppesen, 2009; Carlucci et al., 2015). Past research on country of origin shows that domestic (vs. imported) fish is rated superior (vs. inferior) (see Carlucci et al. (2015) for a review). Thus, it is not surprising that Norwegian consumers prefer cod of Norwegian origin at a low-price level. Consumers also favor fish bought directly off the fishing boat or a fishmonger as opposed to their local store, a supermarket or over the Internet. An explanation for this finding might be that consumers value freshness as a quality cue, i.e. that fish bought in close proximity to catch (fishing boat and fishmonger) is perceived fresher. Østli, Esaiassen, Garitta, Nøstvold, & Hough (2013) for example found that consumers are willing to buy cod not more than five days after capture. The result could also be explained by consumers' need for information upon purchase to evaluate quality satisfactorily. Fish mongers and fishermen are highly trusted information sources to consumers as opposed to advertising and supermarkets (Pieniak, Verbeke, Scholderer, Brunso, & Olsen, 2007).

Fresh fish is considered most attractive, while frozen at sea oust both frozen and thawed fish. These findings coincide with similar research with French consumers (Altintzoglou, Heide, & Carlehög, 2014). Regarding size, smaller units (400 g and 600 g) are favorable to larger units (> 800 g). Vacuum-packed fish is the preferred packaging method. Finally, consumers value skinless fillets (both whole and in portions) more favorably than fillets with skin on.

TABLE 16.3 Part-worth utilities and relative importance of product attributes.

Attributes	Levels	Part-worth utility	Relative importance (%)
Format	Fillet w/ skin	-0.22	9.57
	Fillet skinless	0.20	
	Fillet portion w/ skin	-0.20	
	Fillet portion skinless	0.22	
Condition	Fresh	0.42	15.73
	Frozen at sea	0.21	
	Frozen	-0.06	
	Thawed	-0.57	
Size	400 g	0.24	12.32
	600 g	0.25	
	800 g	0.03	
	1000 g	-0.14	
	2000 g	-0.37	
Country of origin	Norway	0.71	18.34
	Denmark	0.16	
	Russia	-0.16	
	Lithuania	-0.20	
	China	-0.50	
Packaging	Vacuum	0.21	9.97
	Bag	0.06	
	Carton	-0.03	
	Paper	-0.15	
	Plastic tray	-0.09	
Place of purchase	Fishmonger	0.20	15.76
	Local store	0,11	
	Supermarket	0.04	
	Online	-0.57	
	Fishing boat	0.22	

Step 2: Questionnaire

Oneway ANOVA analyses were conducted on i) purchase likelihood, ii) consumption frequency, iii) attitude, iv) purchase frequency frozen, v) purchase frequency fresh, and vi) subjective knowledge, by age. Six age groups were computed (see Figure 2). Post-hoc comparisons were conducted by using Bonferroni. Bonferroni corrections were calculated to protect from Type 1 Error ($\alpha_{\text{corrected}} = .003$).

Regarding purchase likelihood, 70 % of respondents find it likely that they will buy cod fillet within the following month ($M = 4.99$, $SD = 1.87$). There is a significant age-effect on purchase likelihood, where younger (vs. older) consumers are less (vs. more) likely to purchase cod fillet. A main effect of age was found for purchase likelihood, $F(5, 243) = 7.35$, $p < .001$. Consumers < 26 years ($M = 3.68$, $SD = 1.94$) and consumers between 26–35 years ($M = 4.13$, $SD = 2.11$) reported less likelihood of purchasing cod fillets than did consumers between 56–65 years ($M = 5.67$, $SD = 1.62$) and consumers > 65 years ($M = 5.59$, $SD = 1.67$). The youngest consumers find it somewhat unlikely to purchase cod fillet (score below scale midpoint).

Further, consumers hold positive attitudes towards eating cod ($M = 5.64$, $SD = 1.42$). A main effect of age on attitude was found, $F(5, 243) = 6.39$, $p < .001$. The youngest group of consumers (< 26 years) ($M = 4.72$, $SD = 1.52$) hold less favorable attitudes towards eating cod compared to consumers between 56–65 years ($M = 6.21$, $SD = .90$) and consumer > 65 years ($M = 6.07$, $SD = 1.33$).

About half of the respondents consume cod fillet for dinner at least 2–3 times a month ($M = 4.22$, $SD = 1.57$). Older (vs. younger) consumers eat cod fillet for dinner more (vs. less) often. A main effect of age on consumption was found, $F(5, 243) = 5.33$, $p < .001$. None of the comparisons between age groups were statistically significant ($p > .003$).

Consumers purchase fresh and frozen cod fillets rarely ($M = 3.11$, $SD = 1.48$ / $M = 3.28$, $SD = 1.48$, respectively). Main effects of age were also found for purchase frequency of frozen ($F(5, 243) = 3.01$, $p = .012$) and fresh ($F(5, 243) = 3.51$, $p = .004$) cod fillets. No significant differences were found between age groups after Bonferroni correction ($p > .003$).

Consumers report a medium to high level of subjective knowledge about fish ($M = 4.23$, $SD = 1.35$). No main effect of age was found for subjective knowledge ($F(5, 243) = 2.13$, $p = .062$). Figure 16.2 illustrates age differences in attitude and purchase likelihood.

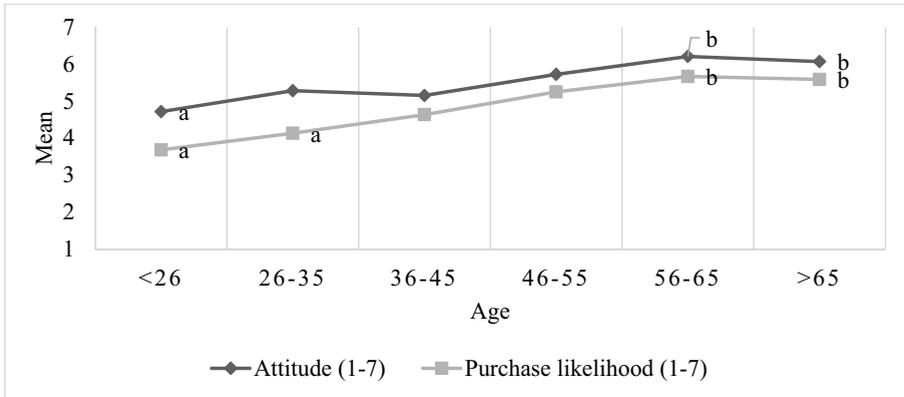


FIGURE 16.2 Comparison of attitude and purchase likelihood by age. Different letters indicate significant difference in mean ($\alpha_{corrected} = .003$).

Four multiple regression analyses were run to assess the ability of attitude and subjective knowledge to predict i) purchase likelihood, ii) consumption frequency, iii) purchase frequency of fresh, and iv) purchase frequency of frozen cod fillets.

The two predictors attitude and subjective knowledge explained 40 % of the variance in purchase likelihood ($R^2 = .40$, $F(2, 246) = 82.8$, $p < .001$). Both attitude ($\beta = .58$, $p < .001$, one-tailed) and subjective knowledge ($\beta = .10$, $p < .05$, one-tailed) were statistically significant.

Further, the two predictors explained 36 % of the variance in consumption frequency ($R^2 = .36$, $F(2, 246) = 70.7$, $p < .001$). Both attitude ($\beta = .50$, $p < .001$, one-tailed) and subjective knowledge ($\beta = .19$, $p < .001$, one-tailed) were statistically significant.

Regarding purchase frequency of fresh cod fillet, total variance explained was 19 %, $F(2, 246) = 30.3$, $p < .001$. Both attitude ($\beta = .23$, $p < .001$, one-tailed) and subjective knowledge ($\beta = .29$, $p < .001$, one-tailed) were found to be significant predictors of purchase frequency of fresh cod fillet.

Finally, regarding purchase frequency of frozen cod fillet, total variance explained was 13 %, $F(2, 246) = 19.4$, $p < .001$. Attitude ($\beta = .50$, $p < .001$, one-tailed), but not subjective knowledge ($\beta = .19$, $p > .05$, one-tailed), was found to significantly predict purchase frequency of frozen cod fillet.

Expectations to the quality and taste of different cod fillets (i.e. condition) are summarized in Figure 16.3. Fresh cod fillets are expected to have the best quality and taste, while thawed cod fillets are expected to have the poorest quality and taste.

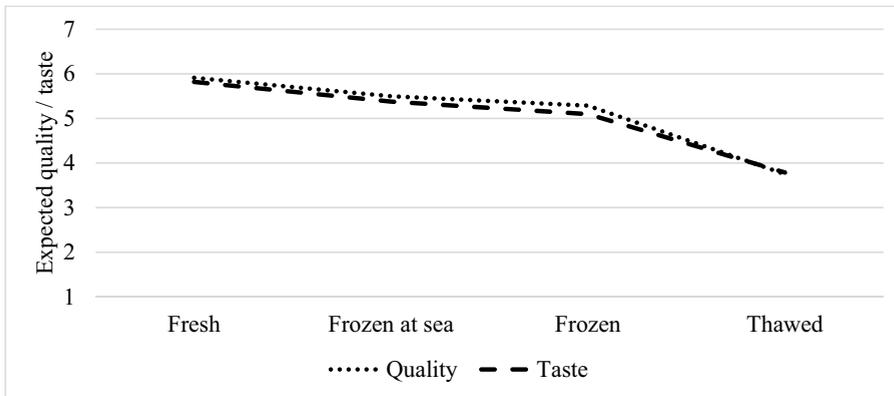


FIGURE 16.3 Expected quality / taste of fresh, frozen at sea, frozen, and thawed cod fillets.

CONCLUSIONS

The main goal of this study was to evaluate the relative importance of product attributes and attribute levels of cod fillet. Results show that origin and price are the two most important attributes to consumers, followed by place of purchase and condition. Maybe not surprising, Norwegians want their fish to be of Norwegian origin and it should be reasonably priced. Preferably also purchased straight off the boat or from a fishmonger, and definitely not off the Internet. Fresh cod fillets outrank fillets frozen at sea, otherwise frozen fillets, and thawed fillets (in that order). Consumer expectations to the quality and taste of cod fillets in these four conditions follow the exact same rank order. Many of these findings coincide well with discussions held in the focus groups and cited literature.

A second goal was to investigate consumption behavior. Generally, consumers have positive attitudes towards eating cod and perceive themselves to have moderate to high level of knowledge about fish. Consumer attitudes and subjective knowledge significantly explain both purchase likelihood and consumption behavior. Consumers' subjective knowledge about fish is found to be an important antecedent for consumption behavior. Higher subjective knowledge about fish positively contributes to purchase frequency of fresh cod fillets, but is not related to purchase frequency of frozen cod fillets. The level of subjective knowledge and its effect on purchase frequency could be explained by difficulties in assessing quality on fresh products, i.e. that purchase frequency of fresh fish requires a higher level of knowledge. Higher (vs. lower) subjective knowledge is also associated with higher (vs. lower) consumption frequency of cod fillet. As expected, we also found that age is positively related to both attitude and purchase likelihood.

Several suggestions to how the fishery industry can generate improved consumer preferences for frozen at sea cod fillets were made during the focus group sessions. The notion that «frozen fish is frozen fish» is challenged as our survey results imply that both fresh and frozen at sea cod fillets are perceived attractive by consumers, while frozen and thawed fillets are found less attractive in comparison. This suggests that consumers are conscious about the difference in preserving methods. Smaller-sized packages are another practical suggestion to make frozen at sea fillets more available to consumers. Consumers also call for information about who, where and how the fish is captured and processed, proposing that such information should be readily available either inside the packaging or printed on the outside. Marketers of frozen at sea fillets could benefit from this knowledge for product development and market communication purposes.

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