**Effects of evoked meal contexts on consumers’ responses to intrinsic and extrinsic product attributes in dry-cured ham**

*Margrethe Hersletha\*, Erminio Monteleoneb, Anne Segtnana, Tormod Næsa,c*

*a Nofima AS, Osloveien 1, PO Box 210, 1431 Ås, Norway*

*b Department of Agricultural Biotechnology, University of Florence, Via Donizetti 6, Firenze, 51144, Italy*

*c University of Copenhagen, Dept. Food Science, 1958 Fredriksberg, Copenhagen, Denmark*

\* Corresponding author: [margrethe.hersleth@nofima.no](mailto:margrethe.hersleth@nofima.no), Tel: +47 64 97 01 00

**Abstract**

To achieve product success in the market, it is important to understand the interplay between sensory and non-sensory product attributes, since both dimensions must be optimised during the product development process. Contextual factors have been shown to affect the outcome of acceptance studies, and it is important that consumer responses to food products are studied in an appropriate eating context. The main objective of this study was to explore how evoked meal contexts affect consumer responses to a set of products in relation to intrinsic and extrinsic cues. Six types of dry-cured ham were described by means of sensory profiling and presented to 120 consumers in a central location test, first in a blind condition (intrinsic rating) and then in an informed condition (extrinsic rating). The measured responses were acceptance and probability of buying. The extrinsic product attributes presented were origin, aging time and price. Moreover, two meal contexts were presented during both intrinsic and extrinsic rating: a traditional meal and a novel meal. The meals were introduced to consumers by means of written texts and pictures. The evoked meal contexts affected both the intrinsic and the extrinsic rating, with the strongest effect being observed for the extrinsic rating. Moreover, consumers were somewhat more discriminating when evoking a traditional meal than when evoking a novel meal. Accordingly, it is important to develop existing consumer testing procedures further, and to incorporate instruments allowing for possible effects of the consumption context.

Keywords:

Evoked meal context, consumer, intrinsic attributes, extrinsic attributes, dry-cured ham

**1. Introduction**

Traditional consumer sensory testing often takes place in a controlled sensory laboratory setting. However, this type of setting has been criticised for not taking into account the product’s consumption context (Meiselman, 1996;

Köster, 2003). According to Köster (2003), consumer testing in the absence of a context may imply a “situational fallacy” with the consequence that consumers may be less involved in the selected products and thus unable to give an accurate hedonic rating. The reason for lack of involvement may be that while the sensory qualities of food allow for product recognition and identification, mental concepts such as product associations created through earlier eating situations/experiences are absent (Lyman, 1989). Therefore, including the consumption context in consumer testing gives a food product more complete meaning and creates more valid responses.

Several approaches have been used to evoke consumption contexts in studies on hedonic rating of food products. Physical environments were varied in Bell & Meiselman (1994) and Hersleth, Mevik, Næs, & Guinard (2003). This approach was extended by Petit & Sieffermann (2007), who used visual, olfactory and auditory cues to induce context. Another approach that may evoke a consumer’s sense of presence in a real situation is the use of written scenarios (Jaeger & Meiselman, 2004; Hein, Hamid, Jaeger, & Delahunty, 2010; Hein, Hamid, Jaeger, & Delahunty, 2012). Written scenarios are statements or brief texts meant to evoke a sense of presence in a real situation. Interesting use was made of this technique in Hein et al. (2010), where test participants developed written scenarios that effectively caused participants to imagine an occasion when they desired a refreshing beverage. Greater sample discrimination was observed under the evoked context condition when written scenarios were used than under a control condition with no evoked context. Further, Sester et al. (2013) investigated the impact of ambience on drink choices. They used physical means (i.e. furniture, colours) to evoke different ambiences in two bar-like environments. The results showed that drink choices differed depending on ambience, and the authors concluded that such an “immersive” approach might be a good tool for exploring the integrated influence of contextual variables on food and drink choices. Finally, recent studies have explored the impact of evoked consumption contexts and appropriateness on emotional responses (Piqueras-Fiszman & Jaeger, 2014a, 2014b, 2014c). These studies aimed at exploring how evoked consumption contexts affect associative emotional responses to products, and the results identified the rationale for evoking consumption contexts during emotion-related tasks.

The influence of consumption context on food perception varies from product to product. Some products are strongly affected by consumers’ expectations (Deliza & MacFie, 1996; Hersleth, Lengard, Verbeke, Guerrero, & Næs, 2011), and associations with specific usage scenarios (Guerrero et al., 2010). For example, wine is a product for which sensory perception is strongly influenced by consumers’ expectations (Hersleth et al., 2003). In contrast, semi-hard cheeses are in many cultures more frequently used products, and acceptance scores are consequently more stable across different eating situations (Hersleth, Ueland, Allain, & Næs, 2005). Accordingly, the need to evoke a consumption context and/or meal context will vary according to the type of product. In some cases, the collected responses will be robust across different contexts/meals, while in other cases the appropriateness of the eating situation is essential for achieving representative results (Schutz & Martens, 2001). Constructing appropriate testing conditions is therefore critical for securing valid consumer responses.

The product evaluated in this study was dry-cured ham, a traditional product in both southern and northern Europe (Hersleth et al., 2011). A traditional way of consuming this product in Norway is in a meal consisting of dry-cured pork, lamb or mutton ham, salami sausage, scrambled eggs and sometimes potato salad. This meal is typically eaten in the summer and/or on special occasions. However, nowadays many Norwegians travel to southern Europe and try other dishes based on dry-cured ham, such as appetisers, finger food and/or tapas. As a result, these novel ways of serving dry-cured ham have become common in Norway. Moreover, imports of Serrano ham and Parma ham to Norway are increasing. In this study we will aim at evoking the two meal formats described above (traditional and novel), using written scenarios and pictures.

Contextual effects may influence both consumers’ probability of buying based on extrinsic product attributes (i.e. in a shop), and consumers’ hedonic perception of products based on intrinsic product attributes. Moreover, when communicating food products in the market, it is desirable that consumers perceive consistency between extrinsic product attributes (i.e. information about price, nutritional value and processing conditions), and intrinsic attributes (i.e. sensory quality during the subsequent eating experience). Accordingly, market success demands an understanding of consumer perception and a focus on the full conceptual presentation of the products. The interplay of intrinsic and extrinsic attributes is therefore a highly interesting topic to study, since both dimensions have to be optimised during the product development process. Various studies have investigated the impact of extrinsic product attributes on consumer acceptance, purchase probability and choice decisions. Examples of important factors are brand and/or price impact (Grunert, 2002; Enneking, Neumann, & Henneberg, 2007), origin and/or manufacturing processes (Caporale & Monteleone, 2004; Iaccarino, Di Monaco, Mincione, Cavella, & Masi, 2006; Hersleth et al., 2011), and nutritional labelling (van Trijp, 2009; Johansen, Næs, Øyås, & Hersleth, 2010). Moreover, sensory literature includes a large assortment of papers discussing the effects of intrinsic product attributes on consumer acceptance of all kinds of products (Lawless & Heymann, 2010). Finally, the interplay between extrinsic and intrinsic attributes has recently been explored using various approaches to conjoint analysis (Johansen et al., 2010; Enneking et al., 2007; Menichelli, Veflen Olsen, Meyer, & Næs, 2012; De Pelsmaeker, Dewettinch, & Gellynch, 2013).

The main objective of this study was to explore how two different evoked meal contexts affect consumer responses to a set of products in relation to intrinsic and extrinsic cues. The product was dry-cured ham and the contexts were a traditional meal and a more novel meal – today the two most common ways of serving dry-cured ham in Norway. The effects of the evoked meals were studied by reference to both the intrinsic product attributes and various extrinsic product attributes (origin, aging time and price). Two common approaches to consumer-testing of food were applied, namely acceptance testing – where consumers’ sensory perception of product attributes is the main focus, and probability of buying – where consumers’ valuation of extrinsic product attributes (cues) is the main interest.

**2. Materials and methods**

**2.1. Products and evoked meals**

Six types of dry-cured ham were selected for the study: two Norwegian, two Italian and two Spanish hams. The Norwegian hams were aged for four months (traditional variant) and 15 months (recently developed for the Norwegian market), respectively. The Italian hams (both Parma), were aged for 15 months and 24 months, respectively. The Spanish hams (both Serrano), were aged for nine months and 18 months, respectively. Table 1 gives an overview of the hams, including information about origin, price and salt levels. The selected hams (origin and aging times) and the prices represent the most common types available on the Norwegian market. Accordingly, asking consumers about probability of buying such products corresponds to a realistic situation. To ensure the availability of sufficient raw materials, two different legs of hams were evaluated in the case of products N4, S9 and N15 (Table 1), while one leg was enough for the remaining products.

Two common Norwegian meal contexts were introduced to the consumers. The first was a traditional meal consisting of dry-cured ham and scrambled eggs (meal 1), while the second (meal 2) was more novel in the Norwegian market, and comprised several small dishes, i.e. “finger food” or “tapas”. Note that the word “tapas” is often used on Norwegian menus to describe meal 2.

**2.2. Descriptive analysis**

Descriptive profiling was done at Nofima to reveal significant differences between the hams. The panel consisted of 12 selected assessors (ISO, 1993), and the method used was Generic Descriptive Analysis (Lawless & Heymann, 2010). The sensory laboratory was designed according to guidelines in ISO (1988). The panel developed a test vocabulary describing differences between samples and agreed upon a consensus list of 25 attributes in total. These attributes related to appearance (colour hue, colour intensity, whiteness, colour uniformity, marbling, dots), odour (sourness, ripe/cured, metallic, meat, rancid), flavour/taste (sourness, sweetness, saltiness, bitterness, ripe/cured, metallic, meat, rancid, after-flavour) and texture/mouth feel (hardness, tenderness, fatness, juiciness, stickiness). A continuous, non-structured line scale was used for evaluation. The left anchor of the scale corresponded to no intensity of each attribute (value 1.0), while the right anchor corresponded to distinct intensity (value 9.0). In a pre-test session, the assessors were trained in the definition of the attributes by testing samples that were considered as extremes of selected attributes typical of dry-cured ham. The slices were cut to a thickness of 0.6 mm on an electrical slicing machine and stored at room temperature for 20 minutes before serving. The panellists evaluated two slices from each sample of ham at 12 +/- 2 °C. For the texture attributes, one slice was rolled before assessment. Water was served to rinse the mouth during the test. All samples were evaluated in replicate and served to the panellists in order across panellists and replicates in four sessions separated by 10-minute breaks. Each assessor conducted a monadic evaluation of the dry-cured ham slices at individual speed using a computerised direct data recording system (EyeQuestion v3.8.13, Logic8, Holland).

**2.3. Consumer test**

**2.3.1. Consumers**

Altogether, 120 consumers from eastern Norway (Oslo region) – 49 males and 71 females aged from 30 to 60 years (mean age 44.8 and SD 6.4) – participated in the test. The consumers were recruited from local clubs and associations based on the following selection criteria: that they like dry-cured ham, that they buy and eat dry-cured ham regularly, and that they had eaten Norwegian ham and either Italian or Spanish ham in the last six months.

**2.3.2. Consumer testing procedure**

The consumer test was run as a central location test (CLT) on Nofima’s premises on two days between 3pm and 7pm, and each consumer attended once. The test was split into a total of six sessions. On Day 1 (60 consumers), the procedure was as follows: (1) intrinsic rating of meal 1 followed by a 10-minute break, (2) intrinsic rating of meal 2, (3) extrinsic ranking of meal 1, (4) extrinsic ranking of meal 2, (5) extrinsic rating of meal 1 and finally, (6) extrinsic rating of meal 2. On Day 2 (60 consumers), meal 2 was presented before meal 1, i.e. the session order was as follows: 2, 1, 4, 3, 6, 5. The ranking data collected at stages 3 and 4 were intended for another study, and will thus not be further described here. All samples were presented according to a cyclic design to avoid order and carry-over effects (MacFie, Bratchell, Greenhoff, & Vallis, 1989).

After the last session (6), the consumers were asked in which meal situation they most often eat dry-cured ham. The following response options were offered: 1) dry-cured ham and scrambled eggs, 2) finger food or tapas, 3) on a slice of bread, and 4) other serving alternatives. Participants were allowed to select more than one meal situation. The software used to collect the data was EyeQuestion v.3.8.6, Logic 8 BV.

*Intrinsic rating*

The intrinsic rating was undertaken in a blind condition. The consumers were served samples one by one (0.6 mm thick half-slice of ham), with plain crackers and water to rinse the mouth during the test. The six samples of dry-cured ham were served twice, i.e. in each of meal 1 and meal 2. The samples were accompanied by written scenarios, including pictures, intended to evoke the two different meal contexts. The pictures representing the two different meals are shown in Figure 1 (meal 1 = traditional meal), and Figure 2 (meal 2 = novel meal). The pictures for the test were chosen by the research group. It was decided that one picture was enough to represent the traditional meal (usually quite a fixed type of meal), while two pictures were needed to represent the novel meal (greater variation in meal types).

The following instructions were given to the consumers during the blind tasting, including intrinsic rating: “*We will serve you six different samples of dry-cured ham. Imagine a situation where you eat a meal with dry-cured ham and scrambled eggs*” (Figure 1, was shown on the screen). Alternatively, consumers were instructed to “*Imagine a situation where you eat dry-cured ham in a meal with several small dishes, i.e. “finger food” or “tapas”* (Figure 2, was shown on the screen). The consumers were also asked “*How much do you like or dislike this dry-cured ham?*” The rating scale shown in Figure 1 and Figure 2 was a modified 9-point hedonic scale (Peryam & Pilgrim, 1957).

*Extrinsic rating*

During extrinsic rating, for which the products were presented in packaged form, it was important that the consumers focused primarily on external attributes. Accordingly, the samples inside all six packages consisted of the same type of neutral/typical dry-cured ham. The information provided in connection with rating the probability of buying was origin of production, aging time and price per 100 g (levels shown in Table 1). The presented prices corresponded to the real prices of the products in the Norwegian market. The information was given on white labels. The origin was indicated by flags, aging time in number of months and prices in NOK per 100 g. Commercial branding of products was not included.

During the extrinsic rating test, six different packages of dry-cured ham with information on origin, aging time and price were presented on the screen (one by one). An example of a picture presented to the consumers is shown in Figure 3 (Norwegian dry-cured ham, four months, NOK 45 per 100 g). When the pictures were presented to the consumers, they were instructed as follows for the traditional meal: “*Imagine that you are in a shop and that you are going to buy a package of dry-cured ham to a meal with dry-cured hams and scrambled eggs. Look at the image and rate your probability of buying this package of dry-cured ham”.* Alternatively, for the novel meal: the participants were instructed to “*Imagine that you are in a shop and that you are going to buy a package of dry-cured ham to a meal composed of several small dishes, i.e. “finger food” or “tapas”. Look at the image and rate your probability of buying this package of dry-cured ham”.* This procedure meant that the pictures of the two meal contexts were not shown in connection with extrinsic rating, so evocation was based on the written text alone. However, it is important to note that all consumers performed blind rating, including both pictures and text, before informed rating. The extrinsic rating was based on a 9-point scale from 1 (= no probability) to 9 (= very high probability).

**2.4. Data analysis**

Analysis of variance (ANOVA) was performed on the descriptive data to identify significant attributes (p<0.05). The model used encompassed the main effects of product and assessor plus product-assessor interaction effects. The effects of products were considered fixed, while the effects of assessors and interaction effects were considered random. To study the main sources of variation in the average sensory descriptive data relating to the dry-cured ham samples, principal component analysis (PCA) of the panel averages of each attribute was conducted on average data using Unscrambler version 10.1 (Camo). Correlation loading plots, including products as dummy variables, were applied, with the inner and outer circles respectively indicating 50 and 100 explained variance (Næs, Brockhoff, & Tomic, 2010).

ANOVA was performed on the acceptance data and the probability-of- buying data for the traditional meal and the novel meal (two-way model with products and consumers considered random). Moreover, separate ANOVA models were prepared for the effects of meal on the acceptance data and probability-of- buying data (GLM model including interaction effects with product, meal and consumers as factors, consumers and interactions considered random). The level of significance in the ANOVA models was p=0.05 and Tukey HSD was used as a post hoc test.

**3. Results**

**3.1. Results from descriptive analyses**

The results of the descriptive analyses of the samples are shown in Figure 4. Significant differences were found for all the 25 attributes and the PCA plot includes average scores of replicates and assessors. For N4, N15 and S9, we needed two different hams to ensure an adequate number of samples for consumer testing. Accordingly, the samples marked “16/2” were served on 16 February and the samples marked “17/2” were served on 17 February. Figure 4 shows that the two hams representing N4 and S9 were very similar, while the two hams representing N15 were slightly different and partly overlapped with the sensory quality of I15 and I24.

Figure 4 reveals that the Norwegian short-aged ham (N4) was described as being quite different from the other five hams. This was due to higher intensity in saltiness, meat odour, meat flavour, metallic odour, metallic flavour and whiteness than the other samples (57% explained variance along PC1). All other samples (except for the Spanish short-aged ham, S9), were characterised by attributes such as ripe/cured odour, ripe/cured flavour, sweetness, sour odour, sourness, tenderness, juiciness, colour intensity and colour uniformity. The long-aged Spanish ham (S18) was most pronounced for these attributes. Figure 4 also shows that bitterness, rancid odour and rancid flavour dominated along PC2 (23% explained variance), and S9 had highest intensity of these attributes. Finally, the salt content values (chemically measured), shown in Table 1 confirm that N4 had the highest salt content of all the hams.

**3.2. Results – meal context frequency**

The consumers’ responses (frequencies) regarding in which meal situation they most often eat dry-cured ham were as follows: a meal of dry-cured ham and scrambled eggs (traditional meal) n=96; finger food or tapas (novel meal) n=81; on a slice of bread n=59 and other serving alternatives n=35 (e.g. with pasta, asparagus, on pizza or barbeque). These results confirm that the two meals chosen for this study are the most common ways of eating dry-cured ham. Moreover, data from this consumer sample shows that the traditional meal is more common than the novel meal, and that the majority of the consumers eat dry-cured hams in several contexts.

**3.3. Results – intrinsic attributes**

The average results for intrinsic rating of the hams in different evoked meal contexts are shown in Figure 5. A possible effect of meal order (day of testing), on rating was checked and disconfirmed. In blind tasting, the consumers recorded the highest acceptance for N4 and I24 and the lowest acceptance for S9 and S18, in both the traditional meal and novel meal scenarios. N15 received a similar score as N4 in the novel meal context, but a significantly lower score than N4 in the traditional meal context.

Figure 5 shows that the acceptance rating patterns of the six products were similar for both meals, but that the products were slightly more differentiated in the traditional meal context than in the novel meal context, especially in the case of the Norwegian and Italian hams. The consumers were probably more familiar with the traditional meal than with the novel meal, as a consequence of both meal frequency (see 3.2), and the fact that the traditional meal has been part of Norwegian food culture for longer than the novel meal. The relatively high mean age of the consumer sample (44.8 years) is a further explanatory factor. Accordingly, the consumers had well-defined hedonic and sensory expectations of the traditional meal (Hersleth el al, 2011). In their study on a refreshing beverage, Hein et al (2010) found larger sample discrimination under an evoked context condition than under a control condition. In this study, the participating consumers had developed the written scenarios used in the test themselves, and good familiarity with the chosen context was thus ensured.

Figure 4 shows that the sensory profiles of I15 and I24 were relatively similar. This should be reflected in the intrinsic rating results. Looking at Figure 5, we can see that there were no significant differences between these two types of ham in the case of the novel meal. However, in the traditional meal, I15 was scored significantly lower than I24. One possible explanation may be that, in the case of the traditional meal, consumer sensitivity was so high that even minor sensory changes in the hams influenced the affective rating. The impact of feelings as a basis for discrimination has been discussed and demonstrated by Frandsen, Dijksterhuis, Brockhoff, Nielsen, & Martens (2007). In their study, they found that consumers were more able to differentiate milk samples in an authenticity test that triggered feelings than in an analytical test. Consequently, it may be that evoking the traditional meal affected consumers’ feelings and increased their sensitivity more than when the novel meal was evoked.

The results of the ANOVA testing of the impact of the evoked meal on intrinsic attributes showed a p-value of 0.05. Moreover, the product-meal interaction effect was significant (p=0.03). This shows that the intrinsic rating was dependent on the meal, and that evoking a meal context for this type of product is relevant when collecting hedonic consumer responses.

**3.4 Results – extrinsic attributes**

The average results for extrinsic rating in the different evoked contexts are shown in Figure 6. A possible effect of meal order (day of testing), on rating was checked and disconfirmed. When rating packages of ham with regard to probability of buying based on extrinsic attributes, the consumers scored N15 the highest in both evoked meal scenarios. N4 scored second-highest in the traditional meal scenario. All samples except N4 scored just under N15 in the novel meal scenario (only I24 scored significantly lower than N15). Moreover, in the traditional meal context, the consumers indicated a significantly lower probability of buying product I24 compared to all other samples, and a significantly lower probability of buying S18 and I15 compared to N4 and N15.

The results of the ANOVA testing of the impact of the evoked meal showed a significant effect of the meal (p=0.01). Moreover, the product-meal interaction was also significant (p<0.001). This shows that extrinsic rating was strongly dependent on the meal, and that evoking a meal context for this type of product is relevant in consumer testing.

Figure 6 illustrates the effect of the evoked meal on the extrinsic rating of samples. This effect is most evident when looking at N15. This sample received a significantly higher score than the other samples in the traditional meal scenario, and this strong pattern was not equally observable in the novel meal context. Moreover, Figure 6 shows a higher discrimination between samples in relation to the traditional meal than the novel meal. This supports the trend observed in relation to intrinsic rating, namely that the consumers were more discriminating in the case of familiar meals than in the case of novel meals. Moreover, it might be that evoking a meal context by written text and pictures is more effective with respect to a familiar meal than a novel meal. The possible underlying reason for the different patterns observed for the traditional meal and the novel meal may be the appropriateness of the different hams for each type of meal. For the traditional Norwegian meal, consumers seemed to prefer the hams labelled as being Norwegian as opposed to the others, while for the tapas meal the hams from Spain and Italy were considered more appropriate and the probability of buying was therefore higher.

**4. Overall discussion and conclusions**

The p-values for the impact of the evoked meal were calculated to be 0.05 for acceptance rating and 0.01 for probability of buying respectively. These results support earlier findings in other studies. Hein et al. (2010) compared consumers’ hedonic ratings of four apple juice samples in an evoked consumption context and under a control condition (no evoked context). Larger sample discrimination was observed under the evoked context condition. The evoked context in Hein et al. (2010) probably allowed consumers to have a sense of being present in the occasion when a refreshing drink was desired. In addition, the consumers in the evoked context reported that they found product evaluation easier and that their responses were more accurate than the consumers under the control condition. In the present study, we also identified a meal effect that was most evident in the case of extrinsic rating, indicating that consumers were able to imagine (or partly imagine), the two different meal contexts.

In a follow-up study by Hein et al. (2012), mean hedonic ratings for four apple and four blackcurrant juices were compared using three evoked consumption contexts and a control context. The results of this study showed that although differences in the overall level of mean hedonic ratings and the liking of individual blackcurrant juice samples were observed in the evoked consumption contexts, the rank order of the juice samples was similar. These results were also confirmed in the present study, where we found similar product rankings for both types of evoked meals under the blind condition. Finally, results reported by Sester et al. (2013) confirm the need for new approaches to generate contextual effects in consumer studies and immersive approaches were suggested as a helpful tool for evoking context. The use of pictures as in the present study may effectively evoke real-life situations, and the results support further application and research in this direction.

In this study, we included both intrinsic and extrinsic cues when exploring the effects of evoked meal contexts. When products bear labels that provide information on origin, price and salt levels, it is possible that various emotional associations with the products are aroused. Piqueras-Fiszman & Jaeger (2014a, 2014b, 2014c) demonstrated that the context in which a food is consumed can affect consumers’ associative emotional responses to that product, and that emotional responses under evoked consumption contexts appear to be consistent over time. Both these findings and the findings in the present study strengthen the rationale for evoking meal and/or consumption contexts when testing labelled products. Due to confounding between the extrinsic cues in this study, we have been unable to estimate the specific effects of the presented information, i.e. origin, processing and price. However, as stated, these factors have previously been shown to influence consumers’ acceptance, purchase probability and choice of a number of food products (Enneking et al., 2007; Hersleth et al., 2011; Johansen et al., 2010). The results of the present study also support the further development of methods, i.e. conjoint analysis combining the effects of intrinsic and extrinsic factors in consumer testing (De Pelsmaeker et al., 2013).

A strong argument for including both intrinsic and extrinsic attributes in contextual research is the pronounced influence of consumer expectations on product choice and perception. When consumers choose a product in the shop, they do so based on previous experience, e.g. brand associations, price, etc. These cues are not necessarily reflected in the sensory attributes they perceive when they eat the product as part of a subsequent meal. A difference between sensory-based and/or hedonic-based expectations and subsequent actual perception may induce assimilations in both positive and negative directions(Deliza & MacFie, 1996; Hersleth et al., 2011). For example, if a person (consumer) plans to serve a traditional Norwegian meal, Figure 6 suggests that he/she will prefer to buy N4, N15 and/or S9 rather than S18, I15 and I24. If he/she had eaten these products in an uninformed condition, N15 and S9 would be perceived as being worse than expected, and N4 would be perceived as better than expected (Figure 5). Unfortunately, we did not include informed ratings in this study, but it seems highly likely that an assimilation towards expectation (probability of buying) would happen and that the relative differences in acceptance scores would approach the pattern seen in Figure 6.

In the case of a novel meal, the probability of buying would be equally high for S9, S18, I15 and I24. However, the significant negative effect seen for S9 in Figure 5 could mean a less successful novel meal in an uninformed eating condition for this sample than for S18, I15 and I24. Thus, information on origin, aging time and price is insufficient to communicate the quality of dry-cured ham. Sensory information should also be included to differentiate products in the market. On the other hand, it may be that commercial product branding (not included in this study), could signal additional sensory attributes which may help consumers’ to choose the right product in a shop.

Despite confounding effects between the extrinsic factors in the present study, some elaboration of the effects of price is possible. Product N4 was the cheapest (EUR 5.60/100 g), and was among the most-liked products in the blind condition. N4 is probably the most common ham sold in the Norwegian market, and the cheapest one compared to other types of dry-cured ham. Therefore, the consumers were quite familiar with this type of product, and preferred its taste to that of the less familiar hams. However, when this product was labelled, it had the lowest buying probability for the novel meal. This shows that the consumers had low expectations for N4 which is consistent with the findings in Hersleth et al. (2011). I24 also received a low buying probability under the informed condition. Here, the relatively high price (EUR 10.60/100 g) was probably so dominant that even any high hedonic expectations of Italian dry-cured ham among the consumers could not neutralise the price effect.

In summary, this study demonstrated an effect of evoked meal context on intrinsic and extrinsic rating of dry-cured ham. This effect was most evident in the case of extrinsic rating, i.e. for the probability of buying and when evoking a familiar meal. Moreover, this study confirms the importance of meeting both consumers’ hedonic and sensory product expectations, and that this may be critical for market success at a time when food habits and meal composition are changing. Accordingly, it is important to improve and develop existing consumer-testing procedures further, and to incorporate instruments allowing for the possible effects of meal and consumption contexts.

**Acknowledgements**

This study was funded by Foundation for Research Levy on Agricultural Products through the Food Choice Project and the research programme “Sensory strategies and consumer insight for healthy and palatable food”.

**References**

Bell, R. & Meiselman, H. L. (1994). Effects of adding an Italian Theme to a restaurant on the perceived ethnicity, acceptability and selection of foods. *Appetite, 22*, 11-24.

Caporale, G. & Monteleone, E. (2004). Influence of information about manufacturing process on beer acceptability, *Food Quality and Preference, 15(3),* 271-278.

De Pelsmaeker, S., Dewettinch, K & Gellynch X. (2013). The possibility of using tasting as a presentation method for sensory stimuli in conjoint analysis. *Trends in Food Science & Technology 29*, 108-115.

Deliza, R., & Mac Fie, H. J. H. (1996). The generation of sensory expectations by external cues and its effect on sensory perception and hedonic ratings: A review. *Journal of Sensory Studies, 11(2),* 103-128.

Enneking, U., Neumann, C., & Henneberg, S. (2007). How important intrinsic and extrinsic product attributes affect purchase decision. *Food Quality and Preference, 18*, 133-138.

Frandsen, L. W., Dijksterhuis, G. B., Brockhoff, P. B., Nielsen, J. H., & Martens, M. (2007). Feelings as a basis for discrimination: Comparison of a modified authenticity test with the same-different test for slightly different types of milk. *Food Quality and Preference, 18,* 97-105.

Grunert, K. G. (2002). Current issues in the understanding of consumer food choice. *Trends in Food Science & Technology 13*, 275-285.

Guerrero, L., Claret, A., Verbeke, W., Enderli, G., Zakowska-Biemans, S., Vanhonacker, F., Issanchou, S., Sajdakowska, M., Granli, B. S., Scalvedi, L., Contel, M., & Hersleth, M. (2010). Perception of traditional food products in six European regions using free word association. *Special Issue of Food Quality and Preference, 21*, 225-233.

Hein, K. A., Hamid, N., Jaeger, S. R., & Delahunty, C. M. (2010*).* Application of a written scenario to evoke a consumption context in a laboratory setting: Effects on hedonic ratings. *Food Quality and Preference, 21*, 410-416.

Hein, K. A., Hamid, N., Jaeger, S. R., & Delahunty, C. M. (2012*).* Effects of evoked consumption contexts on hedonic ratings: A case study with two fruit beverages. *Food Quality and Preference, 26*, 35-44.

Hersleth, M., Mevik, B.-H., Næs, T., & Guinard, J.-X. (2003). Effect of contextual factors on liking for wine - use of robust design methodology. *Food Quality and Preference, 14 (7),* 615-622.

Hersleth, M., Ueland, Ø., Allain, H., & Næs, T. (2005). Consumer acceptance of cheese, influence of different testing conditions. *Food Quality and Preference, 16 (2)*, 103-110.

Hersleth, M., Lengard, V., Verbeke, W., Guerrero, L., & Næs, T. (2011). Consumers’ acceptance of innovations in dry-cured ham: Impact of reduced salt content, prolonged aging time and new origin. *Food Quality and Preference, 22*, 31-41.

Iaccarino, T., Di Monaco, R., Mincione, A., Cavella, S., & Masi, P. (2006). Influence of information on origin and technology on the consumer response: The case of Soppressata salami. *Food Quality and Preference, 17(1-2),* 76-84.

ISO (1988). Sensory analysis - General guidance for the design of test rooms. ISO 8589:1988 (E). ISO, Geneva, Switzerland.

ISO (1993). Sensory analysis - General guidance for the selection, training and monitoring of assessors. ISO 8586-1:1993 (E). ISO, Geneva, Switzerland.

Jaeger, S. R., & Meiselman, H. L. (2004). Perception of meal convenience: the case of at-home evening meals. *Appetite, 42,* 317-325.

Johansen, S. B., Næs, T., Øyås, J., & Hersleth, M. (2010). Acceptance of calorie-reduced yoghurt: Effects of sensory characteristics and product information. *Food Quality and Preference, 21*, 13-21.

Köster, E. P. (2003). The psychology of food choice: some often encountered fallacies, *Food Quality and Preference, 14,* 359-373.

Lawless, H. & Heymann, H. (2010). *Sensory evaluation of food, principles, and practices.* Springer, New York.

Lyman, B (1989). *A psychology of food, more than a matter of taste.* New York: Van Nostrand Reinhold (Chapter 11).

MacFie, H. J., Bratchell, N., Greenhoff, K., & Vallis, L. V. (1989). Designs to balance the effect of order of presentation and first-order carry-over effects in hall tests. *Journal of Sensory Studies, 4,* 129-148.

Meiselman, H. L. (1996). The contextual basis for food acceptance, food choice and food intake: the food, the situation and the individual. In H. L. Meiselman & H. J. H. MacFie (Eds.), *Food choice acceptance and consumption* (pp. 139-263). Glasgow: Blackie Academic and Professional.

Menichelli, E., Veflen Olsen, N., Meyer, C., & Næs, T. (2012). Combining extrinsic and intrinsic information in consumer acceptance studies. *Food Quality and Preference, 23,* 148-159.

Næs, T., Brockhoff, P., & Tomic, O. (2010). *Statistics for sensory and consumer science.* Chichester, UK: John Wiley and sons.

Peryam, D. R., & Pilgrim, F. J. (1957). Hedonic scale method of measuring food preferences. *Food Technology, 11*, 9-14.

Petit, C., & Sieffermann, J. M. (2007). Testing consumer preference for iced-coffee: Does the drinking environment have any influence? *Food Quality and Preference, 18*, 161-171.

Piqueras-Fiszman, B., & Jaeger, S. R. (2014a). The impact of evoked consumption contexts and appropriateness on emotion responses. *Food Quality and Preference, 32,* 277-288.

Piqueras-Fiszman, B., & Jaeger, S. R. (2014b). Emotion responses under evoked consumption contexts: A focus on the consumers’ frequency of product consumption and the stability of responses. *Food Quality and Preference 35*, 24-31.

Piqueras-Fiszman, B., & Jaeger, S. R. (2014c). The impact of the means of context evocation on consumers’ emotion associations towards eating occasions. *Food Quality and Preference 37*, 61-70.

Schutz, H. G. & Martens, M. (2001). Appropriateness as cognitive-contextual measure of food attitudes. In L. Frewer, E. Risvik, & H. Schifferstein (Eds.) *Food, People and Society* (pp. 247-266), Berlin Heidelberg: Springer-Verlag.

Sester, C., Deroy, O., Sutan, A., Galia, F., Desmarchelier, J.-F., Valentin, D., & Dacremont, C. (2013). “Having a drink in a bar”: An immersive approach to explore the effects of context on drink choice. *Food Quality and Preference, 28*, 23-31.

Van Trijp, H. C. M. (2009). Consumer understanding and nutritional communication: key issues in the context of the new EU legislation. *European Journal of Nutrition, 48,* (Suppl 1):S41-S48.

Table 1

Origin, aging time, price and salt content of the six hams

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Labelling | Origin | Aged (months) | Price (per 100 g) | Measured salt % |
| N4 | Norwegian | 4 | NOK 45, EUR 5.80 | 8.7 (16/2), 8.1 (17/2 )\* |
| N15 | Norwegian | 15 | NOK 65, EUR 8.40 | 5.4 (16/2), 5.8 (17/2)\* |
| S9 | Spanish | 9 | NOK 55, EUR 7.10 | 5.6 (16/2), 7.1 (17/2)\* |
| S18 | Spanish | 18 | NOK 75, EUR 9.70 | 5.2 |
| I15 | Italian | 15 | NOK 65, EUR 8.40 | 5.0 |
| I24 | Italian | 24 | NOK 85, EUR 11.00 | 6.6 |

\*Two different hams were used. The number in brackets indicates the serving date.