PHOTO Salt Farm Foundation

Saline Farming

Toolkit for Quality Documentation

SalFar project

WP5 - Activity 2

Food & Bio Cluster Denmark

Interreg North Sea Region SalFar European Regional Development Fund

EUROPEAN UNION

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Purpose

The purpose of this toolkit is to provide farmers and food producers with the proper tools to evaluate the quality of their products with use of commonly acknowledged sensory analysis tools. This toolkit contains explanations of what parameters to evaluate, different sensory analysis methods, and easy-to-implement guidelines and templates for consumer testing.

What do we mean by quality in this context?

This toolkit will enable us to evaluate as objectively as possible those characteristics which effect the acceptability or otherwise of the products we produce to the consumer. These include:

1. **Appearance**
2. **Size**
3. **Shape**
4. **Colour**
5. **Gloss**
6. **Consistency**
7. **Texture**
8. **Flavour**
9. **Adherence to national/international food standards**
10. **Consumption safety (no chemical, physical, or microbial problems)**
11. **Product traceability (e.g. in case of a recall)**
12. **Correct labelling of ingredient/nutrition information**

In this toolkit, we will focus on no. 1 – 8 as these characteristics can be evaluated using sensory analysis methods.

What is Sensory Analysis?

Sensory Analysis is a sensory testing method, used for quality control and evaluating a food product. The evaluation is based on the following factors:

- **Taste**
- **Appearance**
- **Smell**
- **Sound**
- **Texture**

In order to determine these factors a group of persons, the sensory testing panel, has the task of tasting the product. The panel may consist of company employees, consumers, or it may be a trained taste panel.

Læsø, Denmark
PHOTO Food & Bio Cluster Denmark

Taste

Taste is what you experience in your mouth when the product is there and after it has left. There are five basic tastes: sweet, sour, salty, bitter, and umami. However, taste can also be described in other ways:

- The taste of a specific ingredient (vanilla, thyme, alcohol, chocolate, etc.)
- Stable (typical of dairy products)
- Rancid taste (in fats or fatty products)
- Off-taste (undefinable, not pleasant)

It is easier to separate and identify different tastes for someone who has had training or is very experienced at it. Be aware when doing a consumer survey, that this is an untrained sensory testing panel. This can have a big effect on the testing results and it may well be necessary to modify your expectations accordingly.

Appearance

Appearance is also an important sensory parameter. It is difficult to persuade the consumers to taste your product if they do not approve of the appearance. If the product has particular features associated with poor quality, achieving the consumer's acceptance of these features demands a good explanation. Examples include; beverages with sediments at the bottom of the bottle and dairy products with whey excretion. It is possible to achieve the consumer's acceptance if you provide explanations for this, but it is not ideal. Selling new product variants of something well-known, such as white carrots or purple broccoli, can also difficult and demands an explanation.

The following parameters can be tested:

- Colour
- Surface structure (smooth, rough, cracked, uneven)
- Dry/wet
- Gloss (mat/shiny)

Smell

Smell describes the odour the consumer experiences both before and after the product enters the mouth. Taste and smell are closely connected. If you have a reduced sense of smell, your ability to taste is greatly affected. It is easy to test for yourself: Pinch the nostrils together between your thumb and index finger and you are no longer able to smell. Then put food into your mouth, start chewing the product and open the nostrils again. When you reactivate your sense of smell, the taste gets stronger.

Examples of smells:

- Sour
- Sweet
- Spicy
- The smell of specific ingredients (cinnamon, honey, lavender, juniper, onion)

Sound

Sound is also related to the quality of food products. Many consumers relate certain products with a sound.

For example:

- A crack (chocolate, biscuits)
- A crunch (chips, carrots, apple)
- A pop (rice pops cereal)
- Bubbles (carbonated soft drinks)

The sounds are related to the products when opening, handling and eating them.

Texture

texture is how the product feels in your hands and mouth and with your teeth.

Examples of texture:

- Crunchy
- Tough (for example meat)
- Hard
- Soft
- Moist
- Dry
- Creamy
- Pasty
- Jelly
- Grained
- Smooth
- Bubbling

To test texture: you can use ratings from crisp to soft. If you ask the consumer to consider the product on a specific scale, it may be helpful to present them with references they will be fa-miliar with. These are shown on the rating scale and will give the consumer confidence. This will enable then to rate your product more effectively.

PHOTO Salt Farm Foundation

The SalFar project focuses on the degradation of farmland due to salinization.

The first test cultivation in Denmark of salt tolerant plants.
PHOTO Food & Bio Cluster Denmark

Nutritional values

For sale in retail shops it is necessary to get the product tested professionally to determine the nutrition values. It is possible to do this in cooperation with an accredited laboratory or an educational institution. They will measure the nutrition values and prepare a nutrition statement. If students are involved in the nutrition analysis, it will be important for the school to incorporate the analysis in the students' class work. This may require scheduling ahead of time. Using an accredited laboratory will get you a quick and certain result.

Functionality

A product's functions might be qualities such as:

- Solubility
- Gelling ability
- Rising ability
- Emulsifying ability
- Etc.

Functionality influences a product's applicability. It is an important part of product development and the quality control of the final product. These tests are performed either in cooperation with an educational institution or in a laboratory with facilities for testing functionality.

Some product functionalities can be tested by doing simple comparisons in your own kitchen. You just have to make sure that they are prepared exactly the same way each time.

Example

You can test the cooking firmness of different varieties of potatoes by cooking them for a specific amount of time with the same amount of water and salt and compare results.

Different varieties can be tested against each other, or the same variety grown with different salt concentrations in the soil. Similar experiments are possible on other products and parameters. The conditions for the tested products must be the same: same amount, same size, same time, and same temperature.

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Market potential

In order to optimize your chance of success in the market, it is a good idea to test new products on multiple parameters. Attributes such as price and packaging design can also be tested in sensory consumer surveys and the results used to adjust the product during the development process. The results give an indication of how consumers may receive the product as well as providing an opportunity to adjust to meet consumer preferences.

There can be a number of reasons for a consumer buying a product for the first time: advertising, recommendations from friends or family, curiosity, impulse or the attractiveness of the packaging among them. Subsequent purchases are often made on different criteria, taste and flavour being high on the list. It is also important that the product lives up to the consumer's values, standards and preferences. Effective quality management helps to ensure this happens.

In sensory consumer surveys you ask the consumer about their immediate, personal opinion. Since regular consumers are both human and not trained to evaluate food products, their responses will contain a certain degree of variability. The testing methods described in this toolkit are simple methods that are designed to minimize this risk.

What sensory consumer surveys have in common is that respondents give their response immediately after having tasted the sample. From this, you can learn:

- What product the consumer likes best
- If the consumer can taste a difference between different products
- How the consumer describes the product

Food expos, markets and food festivals are great places to do consumer surveys. At these events, consumers are present in large numbers and, typically, many of them have an explicit interest in and passion for food that they are happy to share. It is important that the consumer is introduced to the concept behind the product to be able to give a qualified rating. It is equally important that the food producer has a clear idea of what the purpose of the test is and, based on this, selects a test method that produces a useful result.

Survey examples:

- Which packaging does the consumer like?
- Does the packaging match the concept behind the product?
- Does the price match the concept?

Design test

Two or three packaging designs can be introduced to the consumer who chooses which one he or she would prefer. The test can also be used to get their opinion on which packaging the matches the concept in question best. A third option is to ask consumers to tell you which words come to mind when they see a certain packaging solution. The results can be used to fine-tune the packaging design.

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Price

When a product and concept is finalized you can test the consumer's willingness to pay for it. This can be combined with a taste test, but can also be done separately. The consumer is presented with the finished product and the concept behind the product, followed by the question of how much they are willing to pay for the product. The price of the product can be set in advance and the consumer asked if they would purchase it at that price. It would be beneficial to combine this test with a questionnaire that provides the producer with information about the respondent to get an impression of what consumer segment the product is most appealing to.
Relevant information might be:

- Age
- Gender
- Area code
- Education level
- Family status
  (single/married, children/no children, etc.)
- Meat eater/vegetarian
- Etc.

PHOTO Salt Farm Foundation

The SalFar project

Objectives

- Setting up 10 open field labs on saline agriculture across the North Sea Region.
- Gathering scientific data on the salt tolerance of various crop varieties.
- Developing new and eco-innovative saline products.
- Designing a brand for saline products from the North Sea Region.
- Broad transnational knowledge exchange on saline agriculture.

Aims

- Mitigation of the effects of salinization on coastal agriculture in the North Sea Region.
- Demonstrating innovative agricultural practices on saline soils.
- Strengthening the rural coastal economy of the North Sea Region by creating new business strategies and opportunities for farmers, food producers and entrepreneurs.
- Collecting and analysing baseline information on salinization in the North Sea Region.
- Rethinking environmental and agricultural policies and water management in coastal areas.

Choice of sensory test method

Below is a matrix with different test methods. Please read the descriptions carefully before performing them.

Sensory method matrix

What answers do you need?	Useful when	Test method	The theory behind
Which one of the two products does the consumer like the most?	You are choosing which variant to produce.	Preference test 1	Affective test: Comparison in pairs
How will the consumer rate your product?	You want to know if the consumer likes your products.	Preference test 2	Affective test: Preference measuring by rating
Does the consumer taste the difference between two different products?	You have replaced an ingredient. You are testing if different production is resulting in a new flavour.	Difference test	Discriminative test: Triangle test
How does the consumer describe your product?	You need the consumers' description of your product.	Descriptive test	Descriptive test: Inspired by Free-Choice Profiling

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Preference test 1

In this test, the sensory panel compares two products. The purpose is to examine and deter-mine which of the two products the consumers like the most.

Number of products: 2
Number of participants: Minimum 50

Sensory method matrix

Which product do the respondents prefer?

Procedure

Two products are put in suitable testing cups or is served on two different dishes, labelled with the letter A and B (or marked red/blue, X/Y, 204/115, etc.). The samples are marked with a marker or a label.

Product 1 Product 2

The samples are served at the same time to the sensory tasting panel. If the test requires expla-nation it is given ver-bally just before the tasting, or is written on the top of the response form so the consumer can read it. If the response is in writing, the response form is handed out along with the samples.

Example

If you are testing a salami it is possible to serve the two samples directly from a dish using colour coded toothpicks. Product A is given a red toothpick, and product B is given a blue tooth-pick. The consumer puts the toothpick from the best product in a container, and the other one is thrown in a waste bin.

When the test is done, you can count the red and blue toothpicks. In order to keep the con-sumer's perception of the products neutral during the test, you will benefit choosing a non-transparent container for toothpicks.

Result

The method is simple and easy and gives you the majority's choice of the best product. If 70 % chose sample A and 30 % chose sample B the preference for sample A is clear. If close to each other in results, such as 50/50%, the results show disagreement about whether sample A is bet-ter than sample B.

In this test, the consumers are forced to choose between two products, but the results do not show if they like the products as such, only which one they like the most.

If you would like to learn about which type of consumer is most interested in your product, you can ask a few ques-tions about them to accompany the response. Consider carefully what information would be most useful to you and keep the number of questions relatively low.

Response form - Preference test 1

Short text about purpose and procedure

Which sample do you like the most?

Tick off the answer (X)

A B

About you

Tick off the answer (X)

Age:

Gender: Woman Man Other

Food preferences: Vegetarian Vegan Pescatarian Flexitarian Other

Household type: Single Couple Family w. children Other

Thank you for your participation!

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Preference test 2

The purpose here is preference measurement rating on a scale. You want to examine if the con-sumer likes your products.

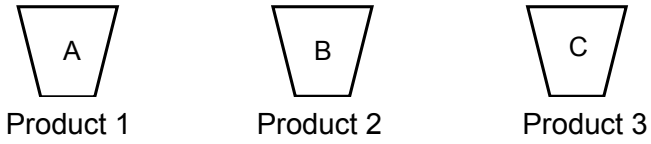
Number of products: 1-5
Number of participants: Minimum 50

Question

How much do the respondents like the product on a set scale?

Procedure

The product is served in a container or on a dish. If you are testing several products, these must be served individually or with a clear marking on each sample and on the response form, so the consumer does not get confused or switch the samples.



	I don't like it	It's only ok	I like it	I fint it delicious
A				
B				
C				

Result

If you would like to learn about which type of consumer is most interested in your product, you can ask a few questions about them to accompany the response. Consider carefully what infor-mation would be most useful to you and keep the number of questions relatively low.

Next page is an example of a response form for preference test 2. The template provided can be modified to fit your specific needs.

Response form - Preference test 2

Short text about purpose and procedure

How much do you like the product?
Tick off the answer (X)

	I don't like it	It's only ok	I like it	I fint it delicious
A				
B				
C				

About you

Tick off the answer (X)

Age:

Do you prefer organic products: Yes No

Food preferences: Vegetarian Vegan Pescatarian Flexitarian Other

Household type: Single Couple Family w. children Other

Postcode:

Thank you for your participation!

Difference Test

The difference test is a triangle test. The purpose is to examine if the respondents can taste a difference between two products by using a reference sample.

Number of products: 2

Number of participants: Minimum 50

Question

Which sample is the same as the reference sample?

Procedure

In this test one of your products serves both as a test sample and as a reference sample, while the other serves only as a test sample. In all, you have three samples in the test. One of your products is labeled Ref (reference) and A, the other product is labeled B.

The three samples are served to the respondent at the same time. You hand out the samples on a dish or a tray in random order along with the response form. Remember to give an explanation to the test either verbally or at the top of the response form. The respondents are instructed to determine which of the samples (A and B) that are identical to the reference sample.

Result

Minimum 50 % of the answers must be correct to be certain of your result. The more correct answers, the more certain result. When 50% or more do taste difference on your products, there is a taste difference.

OBS: The method is not well suited for testing of samples that are very different in appearance.

Once again, you can add questions about the respondents if you want. The template provided can be modified to fit your specific needs.

Response form - Difference test

Short text about purpose and procedure

About you

Tick off the answer (X)

Which sample is equal to the reference?

A B

About you

Woman **Man** **Other**

Age

Household type **Single** **Couple** **Family w. children** **Other**

Postcode

Thank you for your participation!

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Descriptive test

The purpose of this test is to collect descriptive words about your product. It is recommended to include a reference product and have the respondent's description of this as well for comparison.

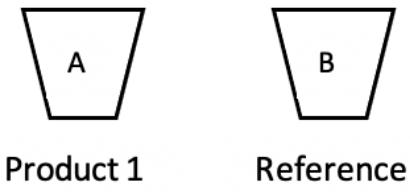
Number of products: 1
Number of participants: 20-30 (or more)

Question

In your own words, how would you describe the product?

Procedure

In this test the consumer describes your product in their own words. The descriptive words are not given in advance. You serve the samples on a dish or a tray in random order along with the response form if you want the feedback in writing. Remember to give an explanation to the test either verbally or at the top of the response form
Remember to give an explanation to the test either verbally or at the top of the response form.



The sensory parameters mentioned in the beginning of this toolkit - look, smell, sound, flavour, texture - may serve as a guide for a description. For example; "Please describe the look of the product?"

As an alternative to written feedback, you can choose to engage in a conversation with the respondent during the test. This provides the opportunity to ask open-ended questions that elaborate the answers and gives you deeper knowledge but may also create a politeness bias because giving negative feedback to your face can feel uncomfortable for the respondent.

Result

You will end up with a lot of words that describe your product. The words will give you an impression of how much the respondents like your product and whether any words keep reappearing as product characteristics.

Questions to the respondents can be included if necessary as with the other tests.

Response form - Descriptive test

Short text about purpose and procedure

What kind of words describe the product?

Product: A

How does the product look?

How does the product smell?

How does the product sound (when breaking, biting or chewing it)?

How does the product feel (when breaking, biting, and in the mouth)?

How does the product taste?

Thank you for your participation!

Preparing for sensory consumer testing

When preparing the consumer testing please consider the following:

- **What is the purpose with the test?**
  Make a description of your purpose.
  Not only for your own sake, but also as an explanation to the consumers tasting your product.

- **What results do you need?**
  Considering this helps you to choose the right sensory testing method. Be specific in your choice. If you use a response form to collect results, it is beneficial to add information about the respondent as well. However, make sure it is not too much or too complicated to fill out.

- **What kind of sensory testing method is most applicable?**
  Choose the method that gives you the most useful result. You can use the sensory method matrix on page 10 in this guide to identify the best method.

- **How to serve the samples?**
  The serving temperature should reflect how they usually are consumed, e.g. soup should be warm and carbonated drinks should be cold, etc. It is important to unlock the full flavour of the product. It might be a challenge that hot and cold products change temperature at room temperature. It is advisable to prepare a smaller number of samples of these product types at a time in order to keep the sample temperature optimal.

  If one of your products has a strong or piercing taste, this might ruin the respondent's ability to taste several samples in a row. This kind of sample must be served at the end of the testing for that reason.

- **What kind of utensils do you need for serving?**
  Will you serve your product in a bowl, directly from a dish or chopping board? Is it necessary to use spoons, forks or toothpicks? Or should the product be consumed with the hands? Remember to use a marker/labels for marking the samples, and plates for serving several samples at the same time.

- **How many samples do you need?**
  You must always have samples big enough for the test you want to perform. For example, if you want to test the cracking of a piece of chocolate, the sample has to be big enough for the respondent to break it in half. You must also provide a sample that is big enough for the respondent to taste it multiple times – especially if you are asking for an evaluation of several parameters.

- **Which of the response form templates do you need?**
  Choose the response form template that provides you with the information you need. Do not make it too simple or too complicated.

- **How are the products treated before the test?**
  Before comparing products during the test, it is important to make sure that the product samples are treated exactly the same, so this does not influence the result. If you are aware of differences in cultivation, storage, etc. this must be noted and included in the interpretation of the results.

Preparations for a consumer test

Below you can see how a consumer test could be prepared and which considerations to take.

Example

I want to compare the taste of two carrots. The first one is produced on regular farmland and the other one produced under more saline conditions. The variety of carrot I am testing is the variety I usually grow. I have noted myself that there is a difference in the taste of the two carrots. I would like to know how the consumers describe tastes of the two carrots and which kind they like the most.

Considerations

When preparing the consumer testing please consider the following:

• What is the purpose with the test?
The purpose is to learn if the sensory differences of two carrots matter to the consumer. If the consumers like the carrot grown on regular non-saline farmland, I need to start a bigger cultivation experiment and find a carrot variety that is more suitable for saline soil.

• What results do you need?
I need descriptions of the two carrots for comparison. I also need to know which one of the two carrots the consumers like the most.

• Which sensory testing method do you need?
I need a combination of descriptive test and preference test. I go for conversations with the respondents and taking notes myself.

• How is the product served?
The carrots are served washed, whole, and raw. More than one respondent can partici-pate at once. I serve one carrot first and ask the respondent to describe it. Afterwards, I ask them to describe the other carrot. Finally, I ask the respondents to choose which of the two they prefer.

• What kind of tools do you need at serving?
I need to identical plates marked A and B, a notebook, and a pen.

• What sample size do you need?
I would like at least 50 responses on which carrot is better. Because I have chosen to take notes myself, I have a good opportunity to tell respondents about my products, so I choose to bring a relatively large amount of products. I will bring 100 of each carrot va-riety.

• What kind of response form template do you need?
For this test, I do not need a template. I will take notes and put an X at the best carrot, A or B, and count the X's afterwards.

• How are the samples treated before the test?
Before the test, I make sure that the two products are prepared in the same way, so this does not influence the result. If I know of any differences during the production that could affect the sensory test, this is noted and taken into account in the interpretation of the results.

Hope this guide was helpful.

Good luck with the sensory consumer testing!

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