INSTITUTO POLITÉCNICO DE BEJA

ESCOLA SUPERIOR Agrária

PRACTICAL HANDBOOK

SENSORY ANALYSIS

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SENSORY ANALYSIS

PRACTICAL 1

1. Taste Acuity Test. To prepare training solutions should use neutral water, without taste, without odour, pure in order to not influence the results (with low mineralization around 20 mg/L) and the following reactives: Citric acid (C_6 H_6 0_7. H_2 O), M = 210,14 g/mole ; Caffeine (C_8 H_{10} N_4 0_2), M = 194, 19 g/mole ; Sodiumchloride (Na Cl) , M = 58,44 g/mole ; Sucrose (C_{12} H_{22} O_{11}) , M= 342,3 g/mole

2. Panellists Selection and Training.The panellists have to identify the elementary tastes and fill up a table given during the session, with all cups code for not identify taste, sour, bitter, sweet and salty.

The sessions must be done in proper rooms by ISO 8589:2007) and the technique used is based on ISO 3972 (2011) which is described above:

2.1. Fundament: To determine the skills to distinguish elementary tastes is presented to each person, by a known sequence, the cups with different diluted substances at different known concentrations.

These solutions are prepared with citric acid, caffeine, sodium chloride and sucrose. After tasting and recognizing the taste the person should mark in the table the identified result.

2.2. Preparation of mother – solutions.For each 1000cc volumetric flask (4 at all), is weight 1,2 g of citric acid, 0,54 g of caffeine, 4g of sodium chloride and 24 g of sucrose; the sucrose solution is not stable and so it should be prepared just a single hours before the session. All these reactives must be diluted with water and the volumetric flask fill up until the mark.

2.3. Dilutions.From the mother-solutions are prepared 2 dilutions for each taste, as it is shown in the next table, for a session with a maximum of 20 panelists.

For each of the 9 volumetric flasks is measured with na 1 L provete the volume of mother-solution (SM), and it's completed untill the mark with water.

Table 1 – Mother-Solutions specifications

SM	**Code**	**cc SM**	**cc water**	**Nº. cups**
Sour	A2	400	600	1 – 20
Sour	A3	320	680	21-40
Caffeine	C2	400	600	41-60
Caffeine	C3	320	680	61 – 80
Sodium chloride	S2	350	650	81 – 100
Sodium chloride	S3	245	755	101 – 120
Sucrose	D2	300	700	121 – 140
Sucrose	D3	180	820	141 – 160
Water		0	1000	161 –180

Source: ISO 3972:2011

In 200 plastic cups of 100cc volume are put round 50cc of each prepared dilution, in a total for each panelists of 9 cups (8 with the different solutions and 1 with water).

2.4. Sensory Analysis.The panellists should not eat 1h before the session, nor smoke, nor even drink coffee at least 1h before (JOCE 1991). The solutions and the room should be at a temperature around 28-30ºC.

At each panelist have to be presented 10 cups, the 9 cups to identify tastes and 1 cup with water to wash his mouth.Each panelist should take a little portion of each cup (around 15cc), by the sequence of the presented coded cups, and try not to go backwards.

2.5. Data analysis

The results are calculated and expressed in percentage of correct answers, and thus at least in a total of 9 cups if 7 cups are correct, which means that 77, 7% is correct, than it's a good result.

TASTE ACUITY RANKING

Name: _____

Date: ____/____/____ **Session n.º: _____**

Cup code	Non identify taste	Sour	Bitter	Salty	Sweet	Water

SENSORY ANALYSIS

PRACTICAL 2

TRIANGULAR TEST – TASTE ACUITY

The triangular tests are used to determine sensorial differences (unspecific) between 2 products.

To the panellist are presented 3 code samples, being referred to him that 2 are the same and 1 is different, and thus the goal is to indicate what the different one is.

It must be given arbitrary codification to the samples, being preferable that the codes change from panellist to panellist in order to avoid influences (accidental or not) between panellists.

3.1. Data collecting

There are two possible ways of collecting data. One is the forced way, in which the panellist is obliged to choose one of the samples to be different, even if he isn't able to recognize any difference between the samples.

In the second one is given option to the panellist to declare that he had not found difference between the samples.

In the case of trained panelists, it's preferable to apply the method that allows the panelist to declare he hadn't seen any difference between the samples, since this information might be useful to assess the samples nature.

In the case of non-trained panellists (consumers) it should be choosen the forced way method, due to the fact that if it's given the other option of not see any difference and thus do not choose, than it shows a trendy in always take this "easiest" way.

3.2. Data analysis

The probability in this test that one panellist chose by chance the different sample is 33,3% (1/3).

However, the problem is to know, for a certain number of panelists, which is the number of correct answers from which point we're able to consider that in fact there is indeed a difference between the samples.

The number of correct answers necessary to obtain significant differences for a determine significance level by be obtain by the following table, which values were calculated by Binominal distribution.

Thus, if the number of correct answers will be superior or equal to the value shown in the table column 3, than this corresponds to a proportion of correct answers significantly superior to $P_0 = 1/3$ for a significance level of 5%.

TableofSignificance

Number of panellists	Testpaircomparasion	Triangular test	Pair comparasion test dual-trial	Test 2 in 5
5	-	4	5	3
6	6	5	6	3
7	7	5	7	3
8	8	6	7	3
9	8	6	8	4
10	9	7	9	4
11	10	7	9	4
12	10	8	10	4
13	11	8	10	4
14	12	9	11	4
15	12	9	12	5
16	13	9	12	5
17	13	10	13	5
18	14	10	13	5
19	15	11	14	5
20	15	11	15	5
21	16	12	15	6
22	17	12	16	6
23	17	12	16	6
24	18	13	17	6
25	18	13	18	6
26	19	14	18	6
27	20	14	19	6
28	20	14	19	7
29	21	15	20	7
30	21	15	20	7

NOTE – All results are for a significance level of 5%.

Source: prNP 2000

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TRIANGULAR TEST

NAME _____

DATE ____ / _____ / _____ SESSION N.º _____

The presented samples A, B and C, are two from the same product and a third is from a different product.

Evaluate and take note in the following table which are the same samples and which is the different one.

PRODUCT	***Sample***	***Sample***
1		
2		

Describe what were the attributes which origin the result

TASTE

_____

THANKS

PRACTICAL 3

DIFFERENCIATION SENSORY ASSYA TO DISTINGISH SMELL FROM AROMA

Name:_____-
Date:_____

Close your nose and introduce the content of the tube inside the mouth cavity and take note of the perceived sensation.
Then open your nose and brief from the nose, and take note of the sensation

SAMPLE	Sensation perception with the nose closed	Sensation perception with the nose open

Recognition and description of Smell Sensory Assay

Name:_____

Date:_____

Different smelling substances are presented. Try to feel it and recognize it or associate to something familiar or even describe it.
In order to do it, take the tube cover/tap and brief in.
If you recognize , write the name of the smell.

Sample code	Recognize the smell?		Identify the smell?		Smell Description (Family or subfamily)	Smell identification
	Yes	No	Yes	No		

PRACTICAL 4

TEXTURE

In sensory terms, the most important property in solids and semi-solids foods is **texture.**

Texture is a property difficult to define...

ISO (1992)
"it's the group of mechanical, geometric and surface properties of a product, detected by mechanical and tactile receptors, and eventually also by visual and hearing receptors."

Some vocabular used to describe food texture:
oHard
oRough
oAdhesive
oCrispy
oSoft
oFirm
oThick
oRubbery
oPasty
oVelvet
oGummy
oSticky
oCrackling
oViscous
oElastic

Examples for Fruits and Vegetables
Fibrous
Hard
Juicy
Floury/Mealy
Crispy
Viscous
Tender
Crunchy
Rough

Due to the complexity of food texture, and supposing that the panelist did not had an anterior experience in sensory area, it's possible that all panelist do not have the same notions related to the texture attributes. Therefore, it should be done a previous test which consist in stimulating the panelists to several different products in order to help them describing texture properties. The results should have a minimum of correct answers around 65%.

TEXTURE ASSESSMENT

NAME :_____ SESSION _____ DATE: _____

To define this attribute consider the samples: Olives, Fresh cheese, candy and boiled egg white

HARDNESS

1							**8**

To define this attribute consider the samples: Brown sugar, crystal sugar and icing sugar

ROUGH

1							**8**

To define this attribute consider the samples:Chips and cake

FRACTURABILITY

1							**8**

To define this attribute consider the samples: Chips and toasts

CRUNCHY

1							**8**

To define this attribute consider the samples: Boiled egg yolk and apple

MEALY/FLOURY

1							**8**

To define this attribute consider the samples: Toffee Candy and Soft Cheese

ADHESIVELY

1							**8**

To define this attribute consider the samples: Pineapple and pear

GRUMMY

1							**8**

To define this attribute consider the samples: Pineapple and pear

FIBROUS

1							**8**

To define this attribute consider the samples: Orange and cookie

MOISTY

1							**8**

To define this attribute consider the samples: Lard and Tuna

OILY

1							**8**

To define this attribute consider the samples: Caramel and Honey

VISCOUS

1							**8**

To define this attribute consider the samples: Goma

SPRINGNESS

1							**8**

PRACTICAL 5

TRAINING
DRY FOOD (SNACKS)

NAME:_____ Date:

INSTRUCTIONS

- Different snacks samples
- Mark the sample code in the scale

1) With the whole snack

COLOR

Light/Dark

Very lightVery dark

APPEARANCE

Expansion Volume

Few volumeMuch volume

2) With half snack

Holes

FewMany

Texturein the Mouth

Hardness (*First bite)*

LowHigh

Crispy

LowHigh

Crunchy

LowHigh

FLAVOUR

Toasted

LowHigh

DESCRIPTORS

NAME:
MAIL:

- YOU WILL HAVE DIFFERENT SAMPLES
- CHOOSE THE MORE CONVENIENT TERMS TO CHARACTERIZE THE SAMPLES
- EVALUATE DE SAMPLES IN THE FOLLOWING ORDER:

- Appearance
- Color
- Aroma
- Taster
- Texture
-

	SAMPLE A	SAMPLE B	SAMPLE C
Appearance			
COLOR			
AROMA			
TASTE			
TEXTURE			

DESCRIPTORS LIST

COLOR

- Gold
- Glow
- Light
- Dark
- Yellow
- Toasted
- Brown

TEXTURE

- Easy to cut with a knife

APPEARANCE

- Homogeneous
- Uniforme
- Dry
- Greasy
- Oily

TEXTURE IN MOUNTH CAVITY

- Crispy
- Gummy
- Sprigness
- Hard
- Tender
- Dry
- Greasy
- Oily
- Juicy

TRAINING
DRY FOOD (SNACKS)

NAME:_____ Date:

Overall acceptability

Worst Best

Thanks for your cooperation!!!!

PRACTICAL 6

BATERRED FOOD SENSORY ANALYSIS

NAME:_____ Date:___/____/_____

INSTRUCTIONS

- 3 BATTERED FOOD SAMPLES
- REFERE THE SAMPLE CODE IN THE PERCEIVED INTENSITY

Color (Light/Dark)

Very light — Very dark

Color homogeneous

Not homogeneous — Very homogeneous

Food-Batter Adherence

Few adherence — Very adherence

Hardness

Few — Many

Crispness (Sound)

Few — Many

Crunchiness

Few — Many

Battered Food Juiciness

Few — Many

Oil amount

Few — Many

Flavour (toasted)

Few — Many

THANKS FOR YOUR COLLABORATION!

GLOSSARY

COLOR

LIGHT/DARK – Color is perceived by a normal person when radiant energy from visible spectrum reaches the eye.Color characteristics are mainlythe tone, saturationandbritghtness (Métodos Físicos-Químicos para Análise de Alimentos, 4ª Edição; 1ª Edição Digital. Cap. VI, pág. 281).

APPEARANCE

EXPANSION VOLUME – Expansion might be explain by the quick volume increase in volume during water evaporation (Maneerote*et al*., 2009 citando Russel, 2001).

HOLES – Holes reveal a useful parameter in dehydrated products quality expanded due to water vapor pressure (Campbell, 1998).

TEXTURE IN MOUTH

HARDNESS – Resistance, there is a short sound and very noisy to fracture (breaking). Necessary bite force (Dijksterhuis*et al*., 2007). Amount of necessary force to break sample (Vicent, 2004).

CRISPY – When sample collapses there's sound projection(Dijksterhuis*et al*., 2007) during the first 3 bites (Cahunier*et al*., 2005). Sound intensity during trituration when mastication occurs with the molar teeths (Lazou*et al*., 2010).

CRUNCHY – When teeths are slowly forced through the product, it's possible to feel more air than compactation(Dijksterhuis*et al*., 2007). After apply a relatively small force, the product fractures abruptly (Vicent, 2004).

FLAVOUR

TOASTED – Aroma due to toasted without any raw character; slightly caramelized (Bruwer*et al*., 2007).

PRACTICAL 7

Methods recommended to sensory evaluation of cheese

1 AIM

This method purpose is to give a general cheese sensory evaluation.

2 SCOPUS

The method dispositions are in Codex Standard A6.

3 GENERAL DISPOSITIONS

The general dispositions of this International Standard most be followed in the cheese sensory evaluation.

4 SAMPLING

4.1 In the case of large cheeses, it's conveniente to colectna adequate sample with a probe.

4.2 In the case of packagecheese fordistribuition, the adequate number of packages should be available.

4.3 Before evaluation, it's recommended to keep the sample in a storage reference temperature or recommended by legislation

4.4 During evaluation, the samples should be at 14 ± 2ºC. For certain type of cheeses, other temperatures could be selected respecting the tolerance of± 2ºC.

5.EVALUATION

5.1. The sensory evaluation should be done by the following scheme:

Appearance–outsider

Appearance - inside

Consistence (texture)

Taste and Odour

- The appearance outside evaluation (for example, shape and crust) is done by visual inspection of the cheese.
- The appearance inside evaluation (for example, eyes, colour) is done by visual inspection of the cut surfaceor the center of the sample
- The consistence evaluation is done using portions obtained by cut or pressing the centreof the sample or by chewing.

- The smell is evaluated by smelling a slice from the cut or from the centre of the cheese. Pieces of cheese are chew to evaluate the taste.

Cheese evaluation Session

In cheese session, the samples are evaluated by a panel (group of panelists) in a sensory room. The panel is made with a minimum of 5 panelists who will evaluate at the most 8 cheeses.

You can have a look to a Sensory Sheet and to a table of evaluation in the cheese quality.

CHEESE ANALYSIS

CHEESE Nº _____

ORGANOLEPTIC EXAM

- CRUST _____ , .
- SHAPE _____ , .
- PASTE _____ , .
- AROMA / TASTE _____ , .
- TOTAL _____ , .

FINAL APRECIATION _____
_____

NAME OF THE PANELISTS _____

CHEESE SENSORY SHEET

NAME:_____ Data:___/____/_____

CRUST

GOOD SHAPE

FEWMUCH

THIN

FEW MUCH

WHOLE

FEW MUCH

Color

Very light Very dark

SHAPE

BELLY

FEW MUCH

STRAIT

FEW MUCH

TEXTURE AND PASTE COLOR

BOUND

FEW MUCH

BUTTERY

FEW MUCH

EYES

FEW MUCH

Cor

WHITE IVORY

PASTE CONSISTENCE

FEW MUCH

TASTE AND AROMA

Bouquet

NOT CLEAN CLEAN

SOUR

FEW MUCH

SALTY

FEW MUCH

SPICY

FEW MUCH

ATIPICAL

FEW MUCH

DISAGRADABLE

FEW MUCH

SOAP

FEW MUCH

MOLDY

FEW MUCH

FLAVOUR
MILK

FEW MUCH

CYNARA

FEW MUCH

BOILED MILK

FEW		MUCH
	Animal	
FEW		MUCH
	SOAP	
FEW		MUCH
	PUTRID	
FEW		MUCH
	SOUR	
FEW		MUCH
	PERSISTENT	
FEW		MUCH
	AFTERTASTE	
FEW		MUCH

SLICED CHEESE SENSORY SHEET

NAME:_____ Date:___/____/_____

COVER (Parafine)

THINNOT THIN

PASTE COLOR

WHITEYELLOW

GLOW

FEW MUCH

PASTE HOMOGENITY

FEW MUCH

EYES

FEW MUCH

SHAPE

BELLY

FEW MUCH

Arestas planas

FEW MUCH

SMELL

Caracteristic

FEW MUCH

Atipical

FEW MUCH

Soap

FEW MUCH

moldy

FEW MUCH

TEXTURE

HARDNESS

FEW MUCH

ADESIVITY

FEW MUCH

CONSISTENT

FEW MUCH

MOISTY

FEW MUCH

TASTE AND AROMA

CARACTERISTIC

NOT CLEANCLEAN

SOUR

FEW MUCH

SALTY

FEW MUCH

SWEET

FEW MUCH

SPICY

FEW MUCH

ATIPICAL

FEW MUCH

SOAP

FEW MUCH

MOLDY

FEW MUCH

FLAVOUR
BOILED MILK

FEW MUCH

SOAP

FEW MUCH

SOUR

FEW MUCH

PERSISTANT

FEW MUCH

AFTERTASTE

FEW MUCH

PRACTICAL 8

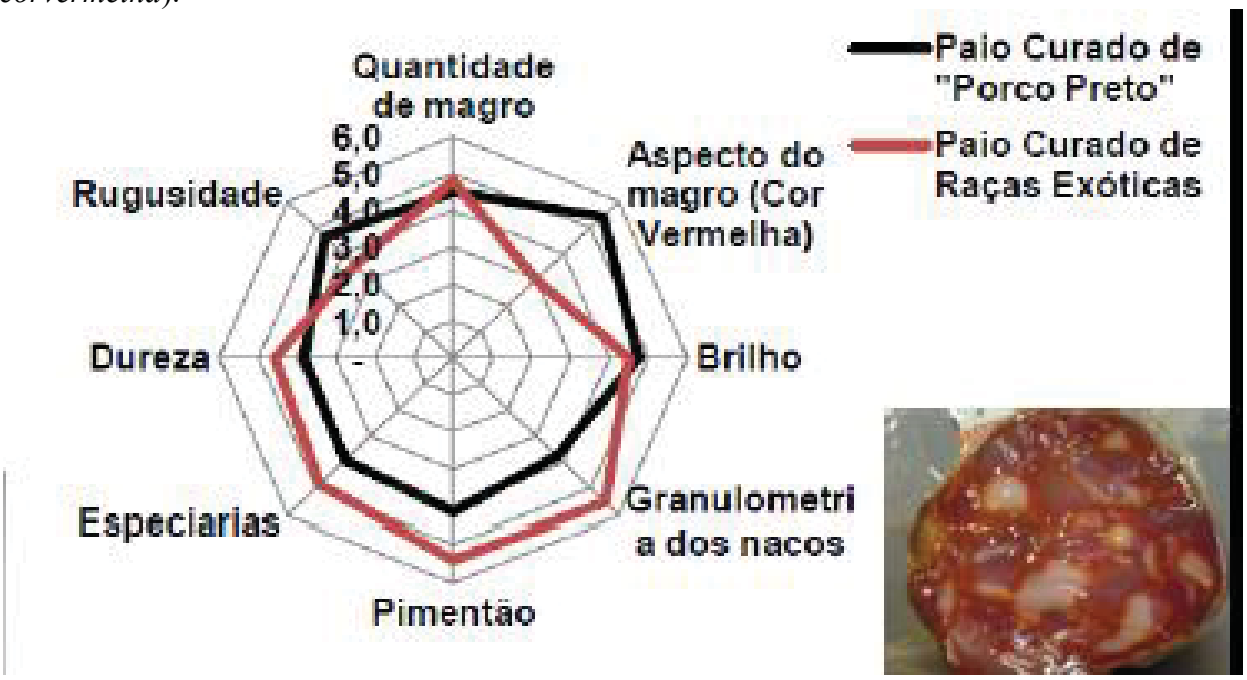
BOILED HAM, SAUSAGES AND SALAMI TRAINING

The evaluation of sausages can be done by an hedonic method, in individual booths, without noise and odours, using a descriptive scale from 0 to 10 scores, non-structured, for the parameters: odour, firmness, juiciness and global quality.

In the meanwhile, in a descriptive method, a trained sensory panel of 12 experts can be used to analyze the samples. Samples were replicated five times.
The descriptive analysis of the samples was obtained through a structured scale considering the attributes

- colour intensity • off colour
- aroma intensity • off aroma
- tenderness • fibrousness
- juiciness
- flavor intensity • off flavor
- salt perception
- global evaluation

Above you can see a web graphic with the results related with the average of all the descriptive attributes used in a cured sausage from 2 different samples: hardness (*dureza)*, spicy (*especiarias*), glow (*brilho*), pepper (*pimentão*), roughness (*rugusidade*), meat amount (*quantidade de magro*) and meat aspect- red color (*aspect magro – corvermelha*).



CURED SAUSAGE SENSORY SHEET

NAME:_____ Date:___/____/_____

COLOR OF THE OUTSIDE COVER

VERY LIGHT VERY DARK

OUSIDE COVER GLOW

FEW MUCH

ADHERENCE OF THE COVER TO THE PASTE

FEW MUCH

FAT AND MEAT DISTRIBUTION

Irregular Regular

MEAT COLOR

REDBROWN

FAT COLOR

WHITEIVORY

PASTE BOUND

FEW MUCH

PEPPER AROMA

FEW MUCH

SMOKE AROMA

FEW MUCH

RANCID AROMA

FEW MUCH

SPICY AROMA

FEW MUCH

SWEET TASTE

FEW MUCH

SALTY TASTE

FEW MUCH

SOUR TASTE

FEW MUCH

RANCID TASTE

FEW MUCH

SMOKE TASTE

FEW MUCH

BITTER TASTE

FEW MUCH

MEAT JUICINESS

FEW MUCH

FAT JUICINESS

FEW MUCH

MEAT TENDERNESS

FEW MUCH

FIBROUS

FEW MUCH

PEPPER FLAVOUR

FEW MUCH

SMOKE FLAVOUR

FEW MUCH

RANCID FLAVOUR

FEW MUCH

PERSISTANCE

FEW MUCH

AFTERTASTE

FEW MUCH

BOILED HAM SENSORY SHEET

NAME:_____ Date:___/____/_____

PINK COLOR

VERY LIGHT VERY DARK

COLOR HOMOGENITY

NOT HOMOGENEOUSVERY HOMOGENEOUS

GLOW

FEW MUCH

FAT INCRUSTATIONS

FEW MUCH

PASTE HOMOGENITY(*)

FEW MUCH

BLACK PEPPER GRAINS(*)

FEW MUCH

SMELL INTESITY

FEW MUCH

"Sui Generis" (CARACTERISTIC) SMELL

FEW MUCH

FRESH SMELL

FEW MUCH

BOILED SMELL

FEW MUCH

BLACK PEPPER SMELL(*)

FEW MUCH

SOUR SMELL

FEW MUCH

SWEET SMELL

FEW MUCH

SALTY SMELL

FEW MUCH

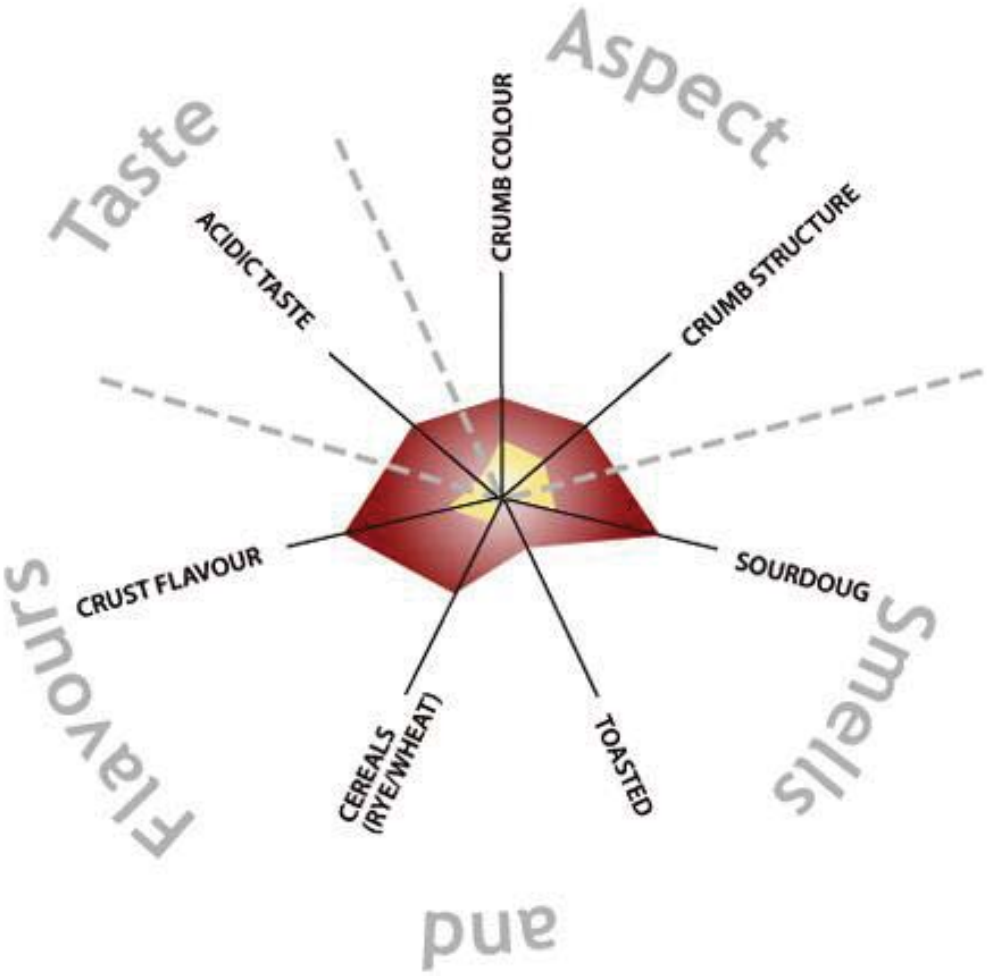
	SOUR TASTE	
FEW	**BITTER TASTE**	MUCH
FEW	**SPICY TASTE**	MUCH
FEW	**HARDNESS**	MUCH
FEW	**JUICINESS**	MUCH
FEW	**PASTY TEXTURE(*)**	MUCH
FEW	**FLAVOUR INTENSITY**	MUCH
FEW	**CHARACTERISTIC FLAVOUR ("Sui Generis")**	MUCH
FEW	**FRESH MEAT FLAVOUR**	MUCH
FEW	**BOILED MEAT FLAVOUR**	MUCH
FEW	**SMOKE FLAVOUR**	MUCH
FEW	**SPICY FLAVOUR**	MUCH
FEW	**BLACK PEPPER FLAVOUR(*)**	MUCH
FEW	**SOUR FLAVOUR**	MUCH
FEW	**RANCID FLAVOUR**	MUCH
FEW	**PERSISTENCE**	MUCH
FEW	**AFTERTASTE**	MUCH
FEW	**GLOBAL ACCEPTABILITY**	MUCH
FEW		MUCH

PRACTICAL 9
BREAD SENSORY ANALYSIS TRAINNING

A) HEDONIC ACCEPTANCE/CONSUMPTION SENSORY EVALUATION

B) QUANTITATIVE DESCRIPTIVE SENSORY ANALYSIS (QDA)

The "sensory wheel": The sensory profils of 2 bread product



BREAD SENSORY SHEET

NAME:_____ Date:_____

INSTRUCTIONS:

- YOU HAVE DIFFERNT SLICES OF BREAD
- INDICATE THE INTENSITY OF THE CORRESPONDENT ATTRIBUTE IN THE BLIND SCALE

1) WITH THE WHOLE SLICE

COLOR

VERY LIGHT VERY DARK

APPEARANCE

EXPANSION VOLUME

FEW VOLUMELOT OF VOLUME

HOLES

FEW MUCH

SIZE OF HOLES

SMALL LARGE

AMOUNT OF GRAINS

FEW MUCH

2) WITH THE SLICE BETWEEN THE FINGERS

TACTIL TEXTURE

SPRINGNESS

FEW MUCH

3) BEFORE INTRODUCING IN MOUTH CAVITY

AROMA

FERMENTED

FEW MUCH

SWEET

FEW MUCH

TOASTED (CRUST)

FEW MUCH

INTEGRAL WHEAT

FEW MUCH

4) IN MOUTH CAVITY

MOUTH TEXTURE

HARDNESS (PALATE COMPRESSION)

FEW MUCH

MOISTY

FEW MUCH

FIBROUS

FEW MUCH

ADESIVITY

FEW MUCH

CHEWINESS

FEW MUCH

TASTE

SWEET

FEW MUCH

SOUR

FEW MUCH

SALTY

FEW MUCH

Integral

FEW MUCH

FERMENTED

FEW MUCH

FLAVOUR

FERMENTED

FEW MUCH

SWEET

FEW MUCH

TOASTED (CRUST)

FEW MUCH

INTEGRAL WHEAT

FEW MUCH

PRACTICAL 10

Mineral Water Sensory Descriptive Evaluation

NAME:_____ Date:___/____/_____

INSTRUCTIONS:

- 4 different code samples
- A glass cup with neutral water (distilled water) to wash the mouth

Transparency

FewMany

Smell

FewMany

Chlorine smell

FewMany

Taste

Sweet

FewMany

Sour

FewMany

Salty

FewMany

Bitter

FewMany

Astringent

FewMany

Flavour

Mineral

FewMany

Earthy

FewMany

Metallic

FewMany

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