UNIVERSITY OF CHEMISTRY AND TECHNOLOGY, PRAGUE
Faculty of Food and Biochemical Technology
Department of Food Analysis and Nutrition

# Sensory analysis

Department of Chemical Analysis and Nutrition

# Department of Chemical Analysis and Nutrition

**Teachers:**

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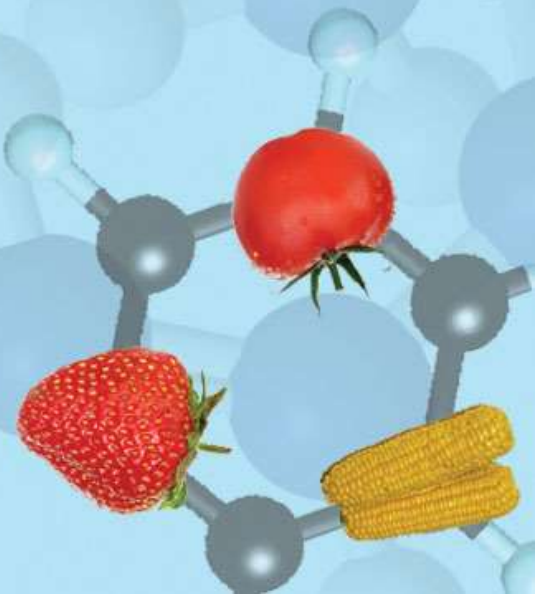
Associated Prof. Dr. Ing. Marek Doležal

Dr. Ing. Vojtech Ilko



UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE


# Dr. Ing. Zdeňka Panovská

## Ústav chemie a analýzy potravin

http://web.vscht.cz/panovskz/

VYSOKÁ ŠKOLA
CHEMICKO-TECHNOLOGICKÁ
V PRAZE

**Vysoká škola chemicko-technologická v Praze, Fakulta potravinářské a biochemické technologie, Ústav chemie a analýzy potravin**
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WWW Ústavu chemie a analýzy potravin: www.vscht.cz/zkp
WWW osobní: web.vscht.cz/panovskz

## Přednášky předmětu Senzorická analýza

1.Úvod do předmětu základy senzorické analýzy
2.Metody senzorické analýzy I
3.Smyslové orgány, receptory
4.Chuťový smysl a základní chutě I
5.Chuťový smysl a další chutě II
6.Čich a vonné látky
7.Taktilní smysly – textura
8.Komodity I
9.Komodity II
10.Hodnocení kosmetických výrobků
11.Konzumentské testy
Přednáška 12
Přednáška 13
Přednáška 14
Aktuality

# Lecture I - Introduction

**The aim of the lecture - what to know**

**Major points:**

Definition of sensory analysis

History

Use of sensory analysis

Laboratory

Assessors

## Content of lectures

I. Introduction

II. Sensory law

3. Senses organs

4. Taste

5. Taste – Sweet, salty, sour

6. Bitter, umami, metallic

7. Smell

8. Aroma

9. Vision

10. Tactil sense, texture

11. Consumer tests

12. Sensory properties of foodstuff I.

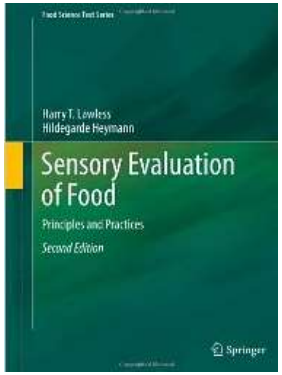
13. Sensory properties of foodstuff II.

# Recommended literature

**Sensory Evaluation of Food**

- ISBN 978-1-4419-6488-5
- Lawless H.T., Heymann H.

Accepted online

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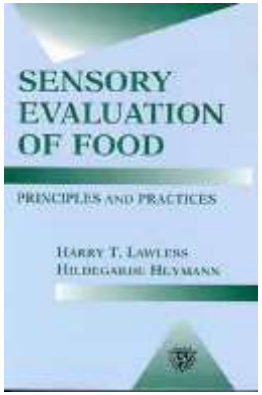


**Sensory Evaluation Techniques**

- D- Meilgaard M. C., Civille G.V., Carr B.C.
- ISBN 9780849338397

Accepted online

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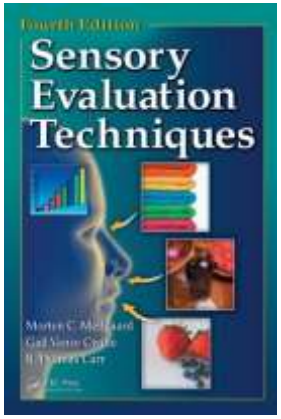
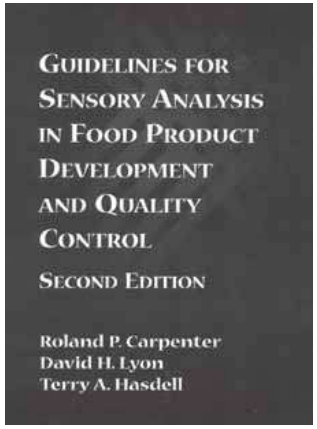


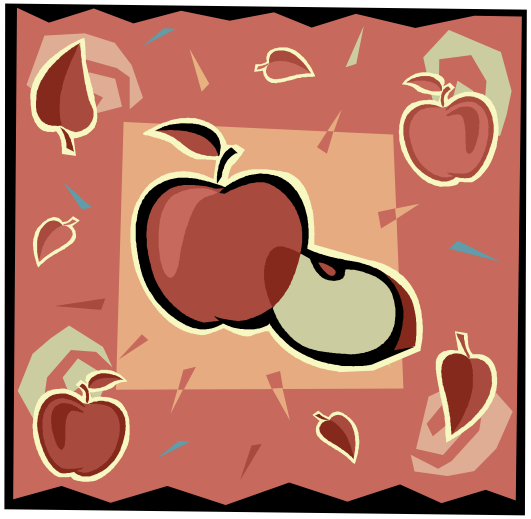

1. J. R. Piggott: Sensory Analysis of Food, Elsevier Science Publishers Ltd., 1988

2. Sensory Evaluation, Guide of Good Practise, Actia, 2001.

3. Tasting and Smelling , Gary K. Beauchamp, Linda Bartoshuk, Academia Press, USA, 1997.

# Why we eat ?

- Hunger
- Fuel our bodies
- Psychological (emotional eating)
- Boredom



# Influences on our food choices

- Culture
- Geography
- Psychology and emotions
- Beliefs and religion
- Health concerns
- Costs
- Social, friends
- Advertising, current food trends

- Technology
- Likes and dislikes
- Special occasions

# Factors influencing food preferences

Emotional state

Cultural learning

Specific hungers

Past experiences

Conditioned flavor aversion

# Sensory Analysis

**Sensory analysis** (**or sensory evaluation**) is a scientific discipline that applies principles of experimental design and statistical analysis to the use of human senses for the purposes of evaluating consumer products.

Definition

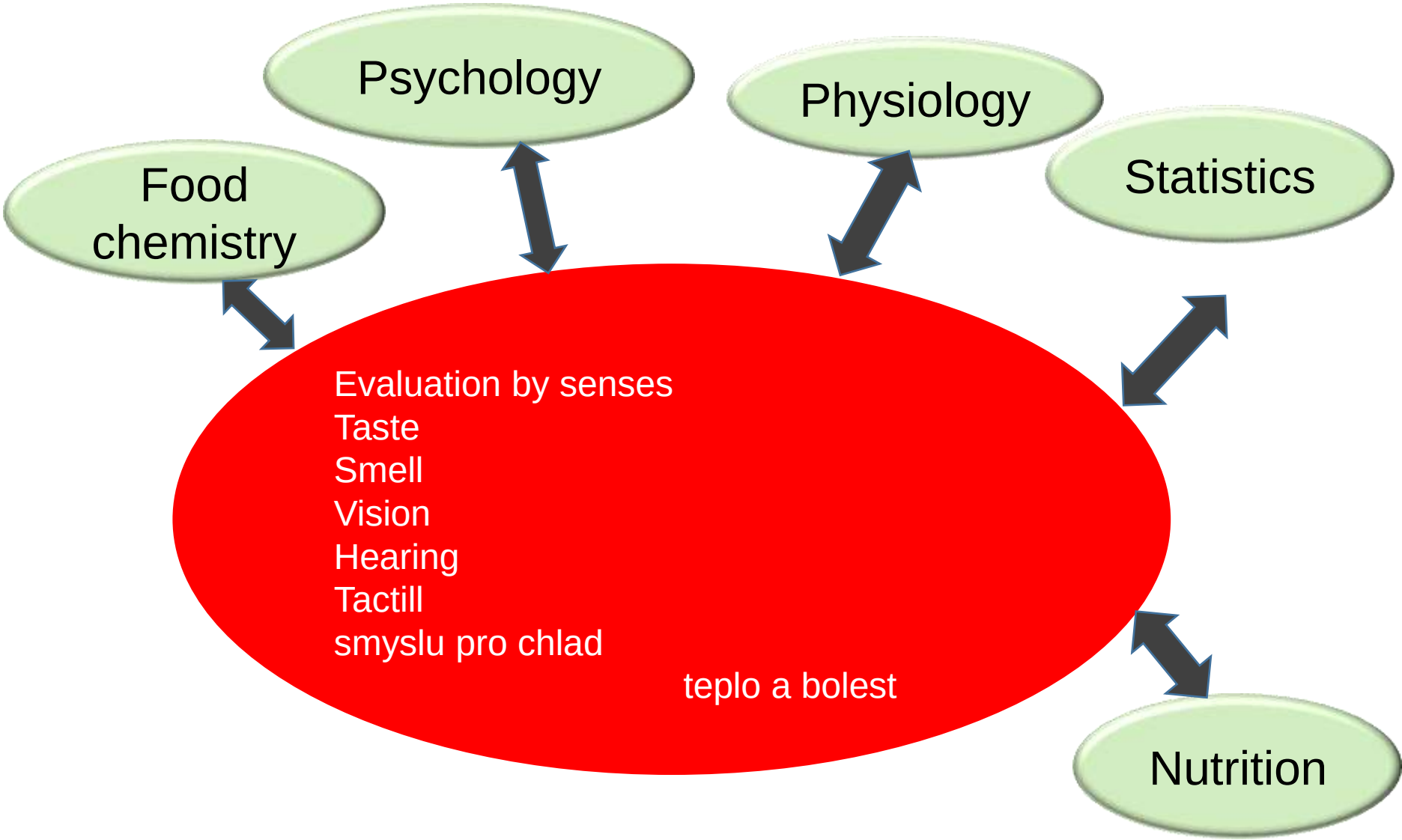
- *"… scientific method used to evoke, measure, analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste and hearing."*

  Stone, H and Sidel, JL. 1993. Sensory Evaluation Practices. 2nd ed. Academic Press: San Diego.





# Sensory analysis



# Sensory Science Scholarship

This scholarship is awarded in honor of the memory of Professor Rose Marie Pangborn, who initiated the scholarship fund to encourage the education of Sensory Scientists intending to pursue academic careers.

Applicants for the scholarship must be enrolled in a Ph. D. Program such as Food Science, Nutrition, Psychology or Physiology. The planned or on-going dissertation research must be on a sensory topic under the guidance of a sensory scientist.

Candidates will be evaluated on the basis of their academic record, intended research in human sensory science, commitment to a career in teaching in the field of sensory science, and support determined by letters of recommendation.

The Board of Directors of the Sensory Science Scholarship Fund (SSSF) will determine policies governing the award and will select recipients.

**Rose Marie Pangborn** (1932-1990)

was an American scientist, born in Las Cruces, New Mexico. She was a pioneer in the sensory analysis of food. Professor Pangborn earned a B.S. at New Mexico State University and a M.S. at Iow State University.
Professor Pangborn also co-authored three textbooks, including the Principles of Sensory Evaluation by Amerine, Pangborn and Roessler, which served as the definitive text for an entire generation of sensory scientists.
She also served on the editorial boards of eight different scientific journals.

# Pangborn Sensory Science Symposium

**10th** 2013, Rio de Janeiro **, 11th** 2015, in Gothenburg, **12th** Rhode Island, USA **13th** 2019 Edinburgh

**Topic List**

Fundamentals of sensory research

Advances in sensory and consumer methodologies

Sensory and instrumental relationships

Sensory evaluation in quality control and product development

Cross-cultural and income-related research

Food choice and consumer behavior

Cross-modal interactions

Sensory properties for health and wellness

Age-related sensory perception and behavior

Sensometrics

Sensory and consumer research of non-food products

# Important organisation

- **ISO** ( INTERNATIONAL STANDARDIZATION ORGANIZATION)
- **ASTM** ( AMERICAN SOCIETY FOR TESTING AND MATERIAL)
- **ESN** The European Sensory Network 18 členů z 15 ti evropských a 2 přidružených zemí.

*Examples of sepcial organisation for comodities:*

- **ICUMSA** (CUKR) International Commission for Uniform Methods of Sugar Analysis
- **AOCS** American oil chemists society (TUKY)
- **IDF** (International dairy organization MLÉKO)
- **IOCCC** The International Office of *Cocoa*, Chocolate and Sugar Confectionery (ČOKOLÁDA)
- **IOC** (International coffee organization KÁVA)

# ISO
# (International Organization for Standardization)

International Organization for Standardization

- a **network** of the national standards institutes of **162 countries,** one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ),

- the world's **largest developer** and publisher of **International Standards.**

The International Organization for Standardization (ISO)/Sub-Committee for Sensory Analysis has responsibility to work out standards for sensory science.

The list of the most important sensory ISO standards is in table 1.

# Table 1 - ISO Standards for sensory science

| ISO Standards Number | Name |
|---|---|
| ISO 3591:1977 | Sensory analysis -- Apparatus -- Wine-tasting glass |
| ISO/CD 3972 | Sensory analysis -- Methodology -- Method of investigating sensitivity of taste |
| ISO 4120:2004 | Sensory analysis -- Methodology -- Triangle test |
| ISO 5492:2008 | Sensory analysis -- Vocabulary |
| ISO 4121:2003 | Sensory analysis -- Guidelines for the use of quantitative response scales |
| ISO 5495:2005 | Sensory analysis -- Methodology -- Paired comparison test |
| ISO 5496:2006 | Sensory analysis -- Methodology -- Initiation and training of assessors in the detection and recognition of odours |
| ISO 6564:1985 | Sensory analysis -- Methodology -- Flavour profile methods |
| ISO 6658:2005 | Sensory analysis -- Methodology -- General guidance |
| ISO 8586-1:1993 | Sensory analysis -- General guidance for the selection, training and monitoring of assessors -- Part 1: Selected assessors |
| ISO 8586-2:2008 | Sensory analysis -- General guidance for the selection, training and monitoring of assessors -- Part 2: Expert sensory assessors |
| ISO 11035:1994 | Sensory analysis -- Identification and selection of descriptors for establishing a sensory profile by a multidimensional approach |
| ISO 11036:1994 | Sensory analysis -- Methodology -- Texture profile |
| ISO 11037:1999 | Sensory analysis -- General guidance and test method for assessment of the colour of foods |
| ISO 16657:2006 | Sensory analysis -- Apparatus -- Olive oil tasting glass |
| ISO 16820:2004 | Sensory analysis -- Methodology -- Sequential analysis |
| ISO 13301:2002 | Sensory analysis -- Methodology -- General guidance for measuring odour, flavour and taste detection thresholds by a three-alternative forced-choice (3-AFC) procedure |

# Links to specific sensory methods

- **www.webstore.ansi.org (search for sensory) I**
- **ISO 8586-1:1993**
- **Sensory analysis -- General guidance for the selection, training and monitoring of assessors -- Part 1: Selected assessors**
- **ISO 13300-1:2006**
- **Sensory analysis - General guidance for the staff of a sensory evaluation laboratory - Part 1: Staff responsibilities**
- **ISO 5496:1992**
  **Sensory analysis - Methodology - Initiation and training of assessors in the detection and recognition of odours**
- **ISO 6564:1985**
- **Sensory analysis -- Methodology -- Flavour profile methods**
- **ISO 13302:2003**
- **Sensory analysis -- Methods for assessing modifications to the flavour of foodstuffs due to packaging**
- **Sensory analysis - Apparatus - Olive oil tasting glass**

# The main application of sensory analysis in Food Industry

1. **Quality control**

2. **Product development**

3. **Others -** psychophysics, senses, rheological properties,

# 1. Quality control

- Monitor quality of all raw materials and products, quality improvement
- Checking regular samples against specification
- Detect differences between products from different runs or batches
- Describe specific characteristics of their products
- Profile the characteristics of new products
- To evaluate a product throughout its storage life

# 2. Product development

- To identify and select possible ingredient substitutions
- Improve products by modifying or changing the ingredients
- To determine if a new or improved product would be acceptable to consumers.
- To evaluate and compare competitors' products
- Demonstrate new products to marketing team
- Promote new or reformulated products to consumers

- Cost reduction exercises

# 3. Others

- Study of function of senses, - investigations of sensory processes (the way we respond to physical stimuli)
- Psychophysics- relations between physical characteristics of stimuli and sensory capabilities
- Rheological properties,
- Aroma,
- Role of age, diseases,…..

Example of job

TESCO

# INTERNAL VACANCY NOTE

*Any employee who considers herself/himself as a suitable candidate for this position may reply to this advert*

**VACANCY:** **PRODUCT ASSESSMENT CENTRE MANAGER**

**REPORTING TO:** Head of Trading Law & Technical Department

**LOCATION:** Praha/Czech Republic

**JOB PURPOSE:** To be responsible of start up and management of the Product Assessment Centre together with development of quality standards and consumer acceptability of Tesco Brand products.

**ACCOUNTABILITIES:**

- To be responsible for ensuring an acceptable quality standard and consumer acceptability of Tesco Brand products across all Commercial area
- To be responsible for set up and management of the Product Assessment Centre
- To ensure that the Product Assessment Centre does promote the Tesco quality attributes and that the pro-active role is taken in promoting Tesco directly/indirectly
- To continually seek optimum cost level of Tesco products testing together in conjuction with buyers/suppliers (i.e. Sensory Evaluation, etc.)
- To be pro-active and act as an advisor on quality and new products development for the Commercial team/suppliers
- To ensure that the sensory and customer testings are being developed
- To provide statistically customer tests
- To ensure that the Product Assessment Centre staff is trained and developed on all needed requirements (i.e. Sensory Evaluation, etc.)
- To ensure that the customer tests are being provided through a helpful advisory and information

**WE REQUIRE:**

- University/Secondary degree (preferably food, quality)
- Knowledge of sensory or evaluation techniques and statistic along side knowledge of the Market Research principle
- Development-product skills
- PC literate (MS Office)
- Previous knowledge of Project management
- Communicative knowledge of English (both written & spoken) is an advantage
- Excellent management & communication skills
- Customer service presentation skills
- Self-drive, influencing
- Driving licence B

**PLEASE SEND APPLICATIONS TO:**

**TESCO STORES ČR a.s.**
**Head Office – Human Resources Dept.**
**Att.: Gabriela Duppová**
**Veselská 663, 199 00 Praha 9 - Letňany**

# Careers in Sensory Analysis

Job Titles:

- Sensory Scientist
- Sensory Analyst
- Sensory Technician

Employers:

- Food processors
- Cosmetic and fragrance manufacturers
- Ingredient manufacturers/suppliers
- Academia (Higher Education)
- Consumer and marketing research firms
- Self-employed/Consultant

Job Responsibilities:

- Experimental design
- Sample Preparation
- Perform, analyze, and report experimental results
- Troubleshooting

# How old is sensory analysis?

Since the early 1900s dairy industry began developing techniques for judging dairy products.

The Contest has come a long way since its initiation in 1916, when it was known as the "Students Butter Judging Contest." Through World War I and II, the Collegiate Dairy Products Evaluation Contest has had a phenomenal record of growth and industry participation. Dairy industry companies support the contest by donating and storing contest samples, as well as provide proctors, scorers and official judges.

**Roald Dahl** describes doing some early evaluation of Cadbury chocolates in the early 1930's. At his school (Repton) the boys would periodically receive plain grey cardboard boxes with 11 new chocolate bar inventions and 1 well-known bar (as a control) in each. The box also contained a piece of paper with the numbers 1 through 12 with a column for a rating from 0-10 and another for comments. Dahl took these quite seriously and one of the comments that he recalls in this memoir is "Too subtle for the common palate". Dahl also credits this early example of sensory science with his beginning to think about inventing rooms in Chocolate factories. Eventually, with this in mind, he wrote **Charlie and the Chocolate Factory**.

# The history of sensory analysis

1944 The importance of food acceptance to the overall mission of the Army
The Food Acceptance Research Branch established by the U.S. Army Quartermaster Subsistence Research and Development Laboratory in Chicago, IL

1949 Development of the Hedonic scale by U.S. Army Quartermaster Laboratory

1957 **First book Publisher on the basics of sensory analysis by Tilgner (Polish)**

1957 Flavour profile method (descriptive analysis) introduced by Arthur D.Little Company

1962 Second sensory analysis book Publisher by Masuyama and Miura (Japan)

1965 Third book on sensory analysis Publisher by Amerine, Pangborn and Roessler

History of food acceptance research in the US Army
Herbert L. Meiselman a,*, Howard G. Schutz
US Army Natick Soldier Center, Natick, MA 01760-5020, USA, University of California Davis, Davis, CA 95616, USA

## Selected events in history of sensory science - continued

1967 The AH-B theory for detection and measurement of sweet taste was proposed

1968 American Society for Testing and Materials (ASTM) – first manual published

1977 ISO standards -a **network** of the national standards institutes of **162 countries,** one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system.

1989 The European Sensory Network was founded to meet the challenge of the rapidly developing science of sensory analysis within Europe, for discussion and collaboration among the best research institutions involved in sensory and consumer sciences and to ensure methods were practical and accessible to the industry. The European Sensory Network brings together 23 member organisations acting in 16 European countries, and four non-European countries.

# Sensory laboratory

Sensory analysis is carried out in controlled conditions

- Separation of the test places by high partition walls – boxes, individual handling of samples
- Controlled light installations for different light - day light, red light,
- Washing facilities with cold and hot water
- Air conditioning

ČSN ISO 8589

MDT (637+663/664):543.92:727.5.01 ČESKOSLOVENSKÁ NORMA Leden 1993

**SENZORICKÁ ANALÝZA**
**OBECNÁ SMĚRNICE PRO USPOŘÁDÁNÍ SENZORICKÉHO PRACOVIŠTĚ**

**ČSN ISO 8589**

56 0036

Sensory analysis – General guidance for the design of test rooms
Analyse sensorielle – Directives générales pour la conception de locaux destinés à l' analyse
Sensorische Analyse – Allgemeine Richtlinien für die Veranstaltung der sensorischen Arbeitsstelle

Tato norma obsahuje ISO 8589 : 1988.

**Národní předmluva**

**Obdobné mezinárodní normy**

ISO 8589:1988 Sensory analysis. General guidance for the design of test rooms (Senzorická analýza. Obecná směrnice pro uspořádání senzorického pracoviště)

**Deskriptory podle Tezauru ISO ROOT**

kód deskriptoru/znění deskriptoru: ITN/smyslová analýza (potravin), BMS.M/zkušební laboratoře, BLB/zkušební zařízení, ATR.J/uspořádání, ZIB.V/předpisy

**Vypracování normy**

Zpracovatel: Česká zemědělská a potravinářská inspekce, Praha, IČO 020 346, ing. J. Barvíř, ing. O. Procházková

Pracovník Federálního úřadu pro normalizaci a měření: ing. H. Vonásková

Federální úřad pro normalizaci a měření

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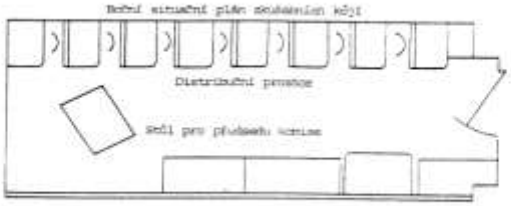
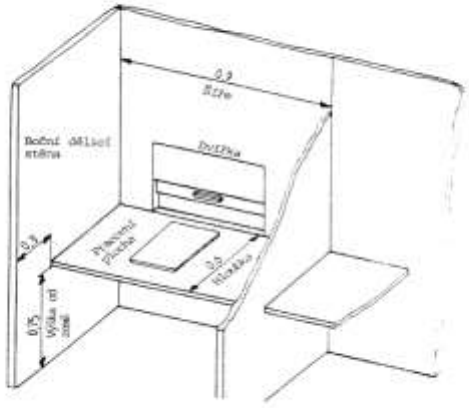
ČSN ISO 8589




Obrázek 10 – Zkušební prostor s možností dohledu předsedou komise

Rozměry v metrech




Obrázek 11 – Půdorysný plán rozměrů zkušební kóje

ČSN ISO 8589: Obecná směrnice pro uspořádání senzorického pracoviště

# Laboratory of sensory science BS20

# Old sensory laboratory

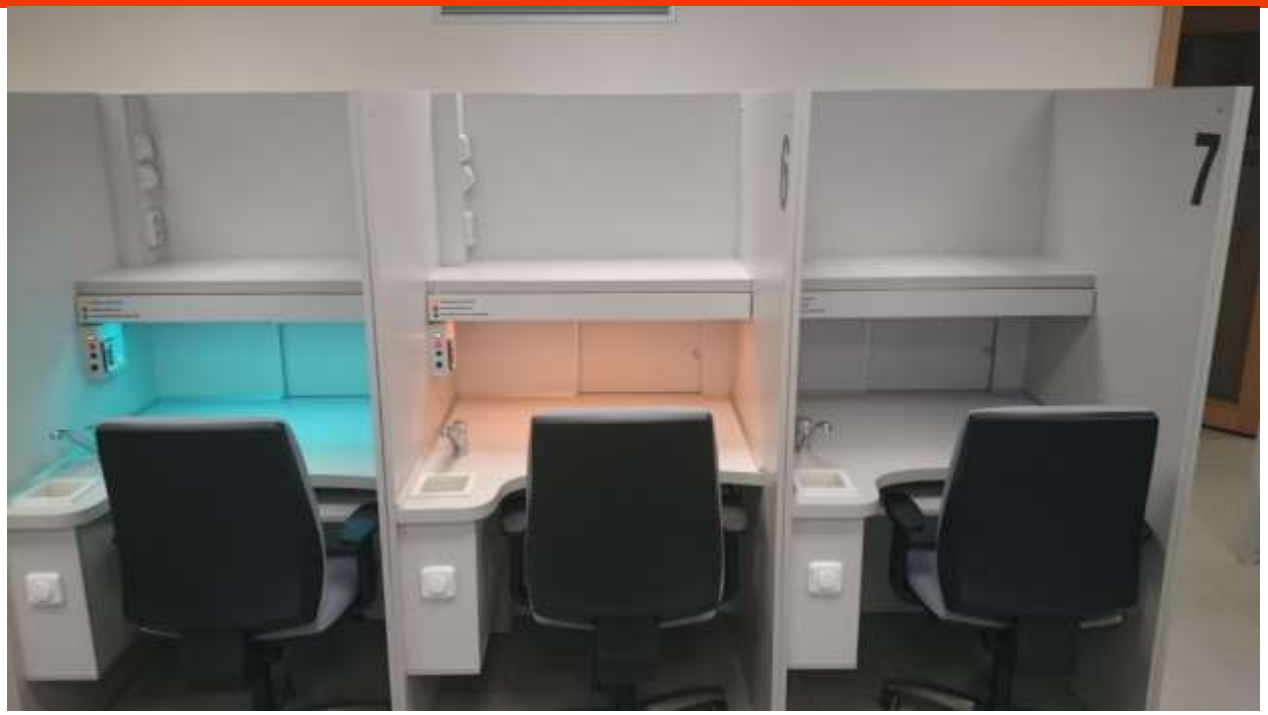
***6 boxes***

***Sample preparation***

***Student room***

# New laboratory

# New laboratory

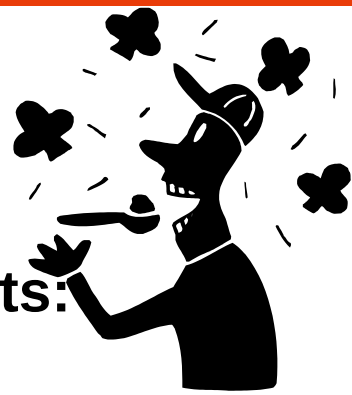

6
7


7
6

# Sensobus


HEAR
TASTE
SEE
TOUCH
Select what you'll enjoy tomorrow
SENSOBUS
Puratos
Puratos
Puratos

# Accesors



- **Sensory evaluation is usually divided in two parts:**

- ***Objective methods -*** *performed by trained persons (trained sensory panel)*

  Panel – group of people

  1. Trained: use 3-10
  2. Semi-trained: use 8-25
  3. Untrained or consumer: use >80

- ***Subjective methods***
- *performed by untrained persons (consumer panel)*

# Sensory evaluation

- Appearance
- Smell
- Taste
- Sound
- Texture

The human brain actually combines the information from each of our senses according to a number of very specific rules.