Bakery wares

Nitra, Slovak Republic

Košice, Slovak Republic

Brno, Czech Republic

Krakow, Poland

FOODINOVO ERASMUS+ PARTNERSHIP

Co-funded by the Erasmus+ Programme of the European Union

Categories of bakery wares

1) Ordinary bakery wares (Bread and rolls)
2) Fine bakery wares

Bakery wares

- Ordinary bakery ware

less than 8 % anhydrous fat and less than 5 % sugar

- Fine bakery ware

at least 8 % anhydrous fat or at least 5 % sugar

Nutrition

- Saccharides
- Polysaccharide
  - Starch
    - Amlose and amlopectin
  - Fibre
    - Soluble – Pentosans (rye), β-glucans (barely, oat)
    - Insoluble - Cellulose, Hemicellulose, Lignin

Nutrition

- Fats
  - Small amount (especially in the germ of the grain)
- Vitamins
  - Vitamins B (B_1, B_2)
- Minerals
  - Mg, Ca, Fe

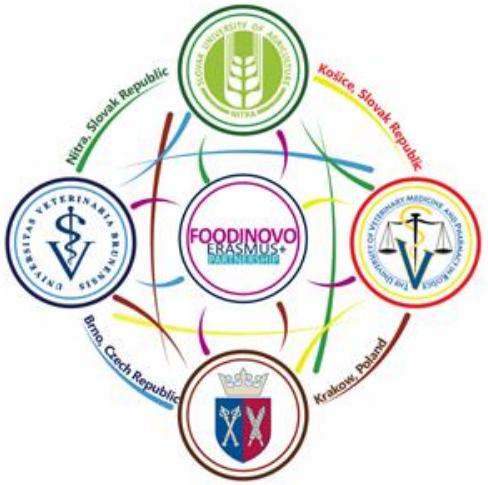
Nutrition

- Proteins
  - 9-13%
  - Incomplete proteins (↑glutamine, proline**, ↓lysine**)
  - From a technological point of view, the most important protein is gluten
  - Gluten forms the „skeleton“ of the dough

Wheat gluten

- Glutenins (glutelins) and gliadins (prolamins)
- Gliadins- viscosity and extensibility
- Glutenins – strength and elasticity
- Mixing of the dough
  - Change in original structure of gluten
  - Molecules of glutenin interconnest
  - Gliadins penetrate between the glutenins
  - Three-dimensional viscoelastic structure in the dough

Celiac disease



- Systemic autoimmune disease
- Coused by gluten and other prolamins
- 0.5-1% of the population
- Gluten-free diet
- Digestive symptoms, especially diarrhea, chronic constipation, vomiting, weight loss
- Bloating and malnutrition

Wheat allergy

- Hypersensitivity reaction to wheat proteins in which IgE and release of chemical mediators such as histamine
- Digestive, respirátory,cutaneous symptoms

Non-celiac gluten sensitivity

- Health problems related to ingestion of gluten and other wheat proteins
- There is still no certainty about its prevalence
- Abdominal pain, chronic diarrhea,fatigue, abdominal distension, eczema, headache, blurred vision, depression, anemia, joint pain.

Gluten-free products

- Regulation (EU) 1169/2011 – list of allergens
- Regulation (EU) No 828/2014
  - 'GLUTEN-FREE' – no more than 20 mg/kg of gluten
  - 'VERY LOW GLUTEN' - no more than 100 mg/kg of gluten
  - Oats contained in a food presented as gluten-free or very low gluten – no more than 20 mg/kg of gluten in oats

Ordinary bakery wares


Nitra, Slovak Republic
Košice, Slovak Republic
FOODINOVO
ERASMUS+
Brno, Czech Republic
Krakow, Poland
Velatický chléb

Rolls

Rolls- Raw materials

- Flour (Wheat)
- Yeast - *Saccharomyces cerevisie* Hansen
- Sugar
- Salt
- Oil/lard
- Water
- Improving agents

Rolls - Improving agents

- Enzymes
- Emulsifiers
- Ascorbic acid
- Acidity regulators
- Malt products
- Hydrocoloids

Technology

- Straight dough method

Dough kneading

Proofing

Dough dividing

Shaping rolls (moulding)

Proofing

Baking

Cooling

Breads

Ingredients

- Flour – wheat, rye
- Sourdough / Yeast
- Water
- Salt
- Spice – caraway
- Improving agents

Sourdough starter/leaven

- Water suspension of rye flour with yeasts and lactic acid bacteria
- Alcoholic fermentation
  - Anaerobic process
  - Glucose → ethanol + carbon dioxide + energy
  - Secondary products: glycerol, organic acids (lactic acid, succinic acid, oxalic acid)
- Lactic fermentation
  - The lactic acid bacteria (LAB)
  - Characteristic taste and aroma
  - Glucose → lactic acid + acetic acid

  (+succinic acid, malic acid, tartaric acid, ..)

Types of lactic fermentation

- Homofermentative
- LAB ferments sugars to produce lactic acid

- Heterofermentative
- LAB ferments sugars to produce lactic acid, acetic acid, carbon dioxide and other products

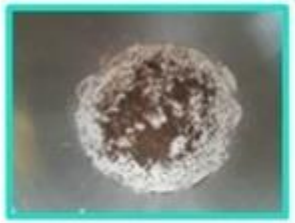
- The optimum ratio of lactic acid to acetic acid is 3:1 to 4:1

Technology

- Straight dough method
- Sponge and dough method

Leaven

Sponge and dough method



Raw material dosing

Kneading

Proofing

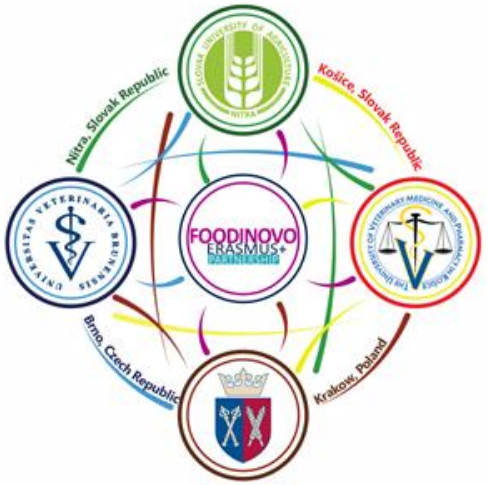
Dividing

Shaping

Proofing

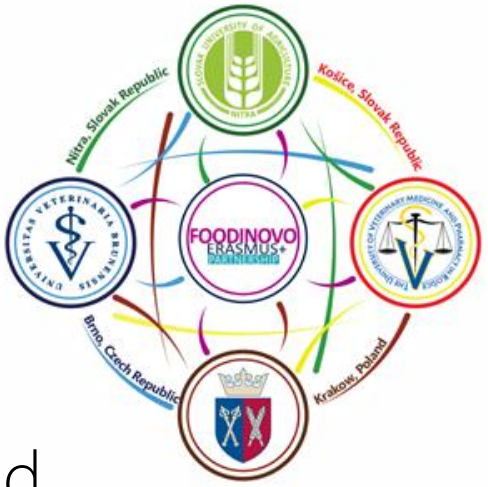
Baking and Cooling

Kneading



- Homogenisation of raw materials
- Aeration of dough
- Swelling of proteins, hydration of starch and pentosans
- Gluten crosslinking -> traps CO_2 bubbles -> increases volume

Proofing



- It usually takes 15-30 min.
- 1. colloidal changes - sufficient swelling of starch, pentosans and proteins
- 2. enzymatic processes - breakdown of high molecular weight substances into lower degraded products (simple sugars, amino acids, dextrins)
- 3. microbiological processes - multiplication of fermentative microorganisms and formation of their metabolites (ethanol, organic acids, CO_2)

Dividing

- The dough is divided into pieces of the required weight.
- Can be done manually or by machine

Proofing bread in the proofing basket

- Proofing takes between 40 - 50 minutes.

Baking of bread

- Phase 1:
  - Hot steam, 1 - 3 minutes
  - Formation of an elastic layer on the surface of the bread
- Phase 2:
  - 10-20 minutes at high temperature - 250→230 °C
  - Increase the volume of bread
- Phase 3:
  - 200 °C, 10-20 minutes
  - The crust of the bread is coloured
- Phase 4:
  - 170-190 °C, 15-30 minutes

Bakery products evaluation

- Product shape
- Crust
  - Colour and crispness
  - Hardness
- Crumb
  - Elasticity
  - Porosity
- Mouth feel
- Taste and aroma
- Chewing sensation
- Defects

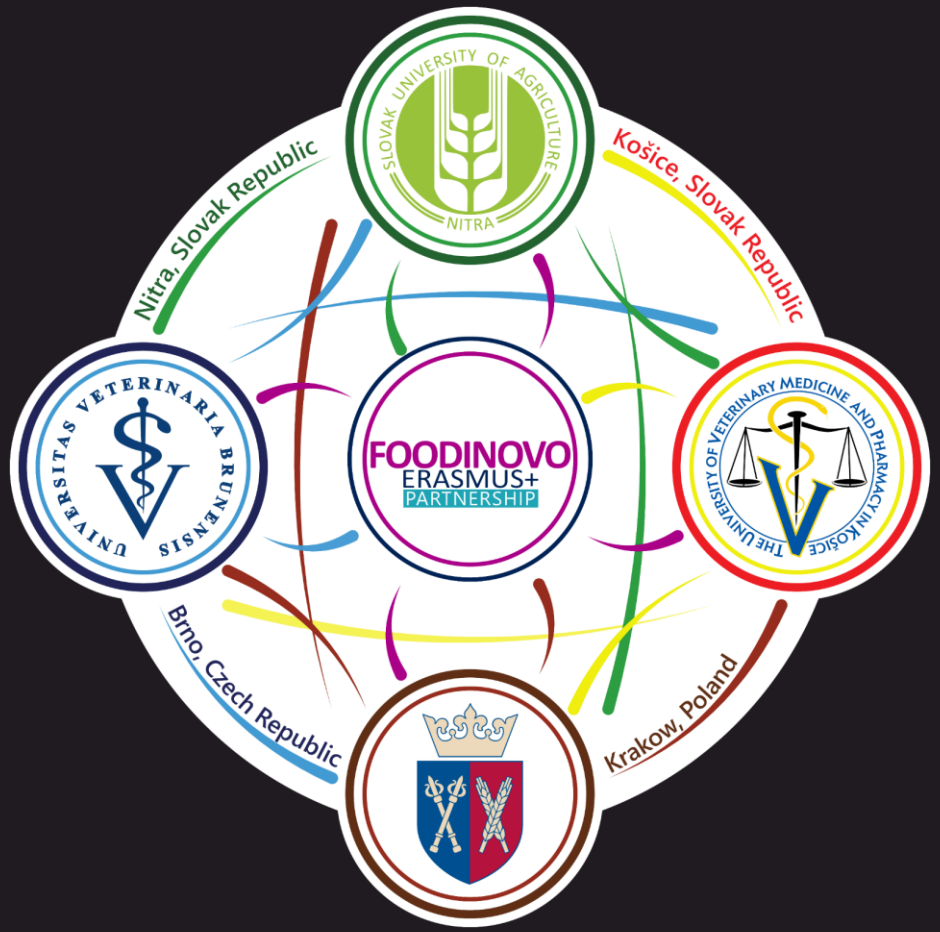
This work was co-funded by the Erasmus+ Programme of the European Union

Innovation of the structure and content of study programs profiling food study fields with a view to digitizing teaching

Táto publikácia bola spolufinancovaná programom Európskej Únie Erasmus+

Inovácia štruktúry a obsahového zamerania študijných programov profilujúcich potravinárske študijné odbory s ohľadom na digitalizáciu výučby

FOODINOVO | 2020-1-SK01-KA203-078333



Co-funded by the Erasmus+ Programme of the European Union

Co-funded by the Erasmus+ Programme of the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Financované Európskou úniou. Vyjadrené názory a postoje sú názormi a vyhláseniami autora(-ov) a nemusia nevyhnutne odrážať názory a stanoviská Európskej únie alebo Európskej výkonnej agentúry pre vzdelávanie a kultúru (EACEA). Európska únia ani EACEA za ne nepreberajú žiadnu zodpovednosť.

FOODINOVO | 2020-1-SK01-KA203-078333