Hygiene requirements for food of plant origin

Nitra, Slovak Republic

Košice, Slovak Republic

Brno, Czech Republic

Krakow, Poland

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COMMISSION REGULATION (EU) No 2073/2005

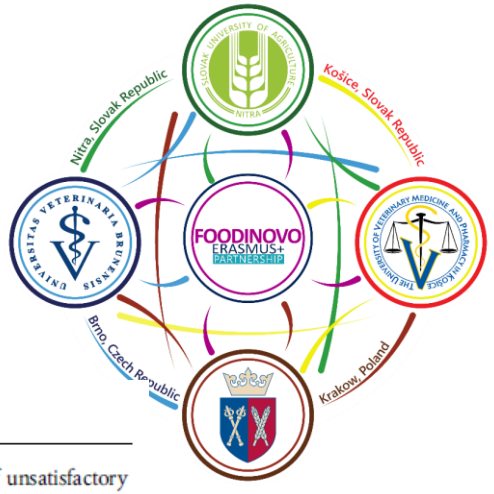
- General requirements

Food business operators shall ensure that foodstuffs comply with the relevant microbiological criteria set out in Annex I. To this end the food business operators at each stage of food production, processing and distribution, including retail, shall take measures, as part of their procedures based on HACCP principles together with the implementation of good hygiene practice, to ensure the following:

- that the supply, handling and processing of raw materials and foodstuffs under their control are carried out in such a way that the process hygiene criteria are met
- that the food safety criteria applicable throughout the shelf-life of the products can be met under reasonably foreseeable conditions of distribution, storage and use.

As necessary, the food business operators responsible for the manufacture of the product shall conduct studies in accordance with Annex II in order to investigate compliance with the criteria throughout the shelf-life. In particular, this applies to ready-to-eat foods that are able to support the growth of Listeria monocytogenes and that may pose a Listeria monocytogenes risk for public health.

COMMISSION REGULATION (EU) No 2073/2005



2.5. Vegetables, fruits and products thereof

Food category	Micro-organisms	Sampling plan (1)		Limits		Analytical reference method (2)	Stage where the criterion applies	Action in case of unsatisfactory results
		n	c	m	M			
2.5.1. Pre-cut fruit and vegetables (ready-to-eat)	*E.coli*	5	2	100 cfu/g	1 000 cfu/g	ISO 16649- 1 or 2	Manufacturing process	Improvements in production hygiene, selection of raw materials
2.5.2. Unpasteurised fruit and vegetable juices (ready-to-eat)	*E.coli*	5	2	100 cfu/g	1 000 cfu/g	ISO 16649- 1 or 2	Manufacturing process	Improvements in production hygiene, selection of raw materials

(1) n = number of units comprising the sample; c = number of sample units giving values between m and M.
(2) The most recent edition of the standard shall be used.

Interpretation of the test results

The limits given refer to each sample unit tested.

The test results demonstrate the microbiological quality of the process tested.

E. coli in pre-cut fruit and vegetables (ready-to-eat) and in unpasteurised fruit and vegetable juices (ready-to-eat):

— satisfactory, if all the values observed are $\leq$ m,

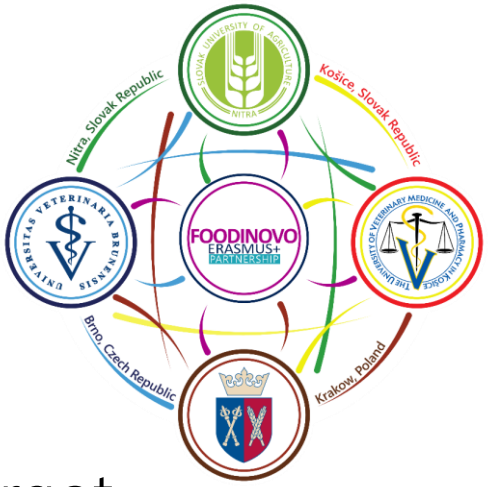
— acceptable, if a maximum of c/n values are between m and M, and the rest of the values observed are $\leq$ m,

— unsatisfactory, if one or more of the values observed are >M or more than c/n values are between m and M.

Hygiene requirements for food of plant origin

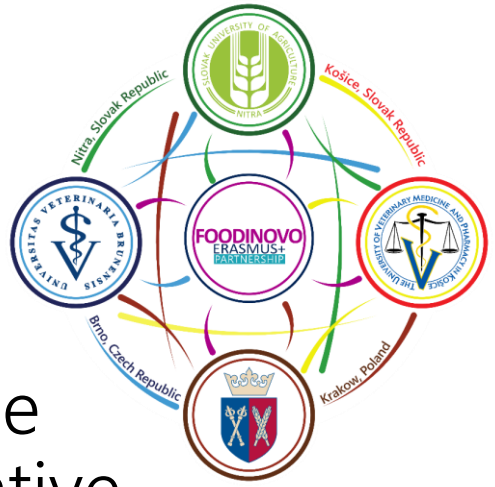
Cereal products

The mill – raw material control



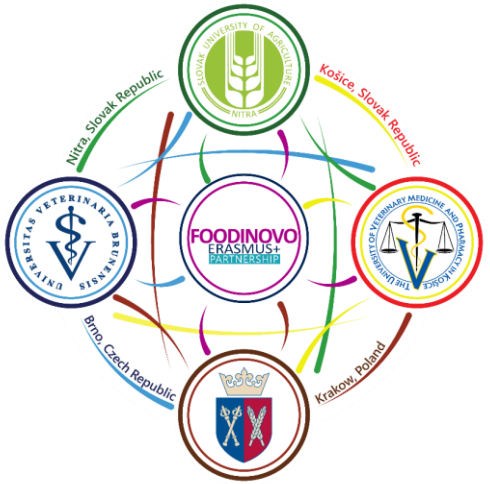
- Grain intake
  - Sensory evaluation – weed seeds and contaminants, Mould, Ergot, Insect pestes
  - Laboratory evaluation – especially moisture, mycotoxins (confirmation of the presence of moulds), ergot, ash
- Extermination
  - Regular extermination of the mill (lures, hydrogen cyanide gassing-1x per year)
  - Rodents, *Sitophilus granariu*, Tribolium spp
  - Entoleter – mechanical mixing of flour
    – destruction of insects, germs potentially contain in the flour

Storage of cereal products



- EU legislation: basic law Regulation (EC) no 852/200of the European Parliament and of the council (see basic legislative hygiene)
- Czech legislation (Decree 18/2020 Sb.)
- Milling cereal products and rice shall be stored separately from aromatics and stored in ventilated areas, in dry conditions and on floors at a distance of 5 cm from the wall, except for loose bags over 25 kg which may be stored on the floor

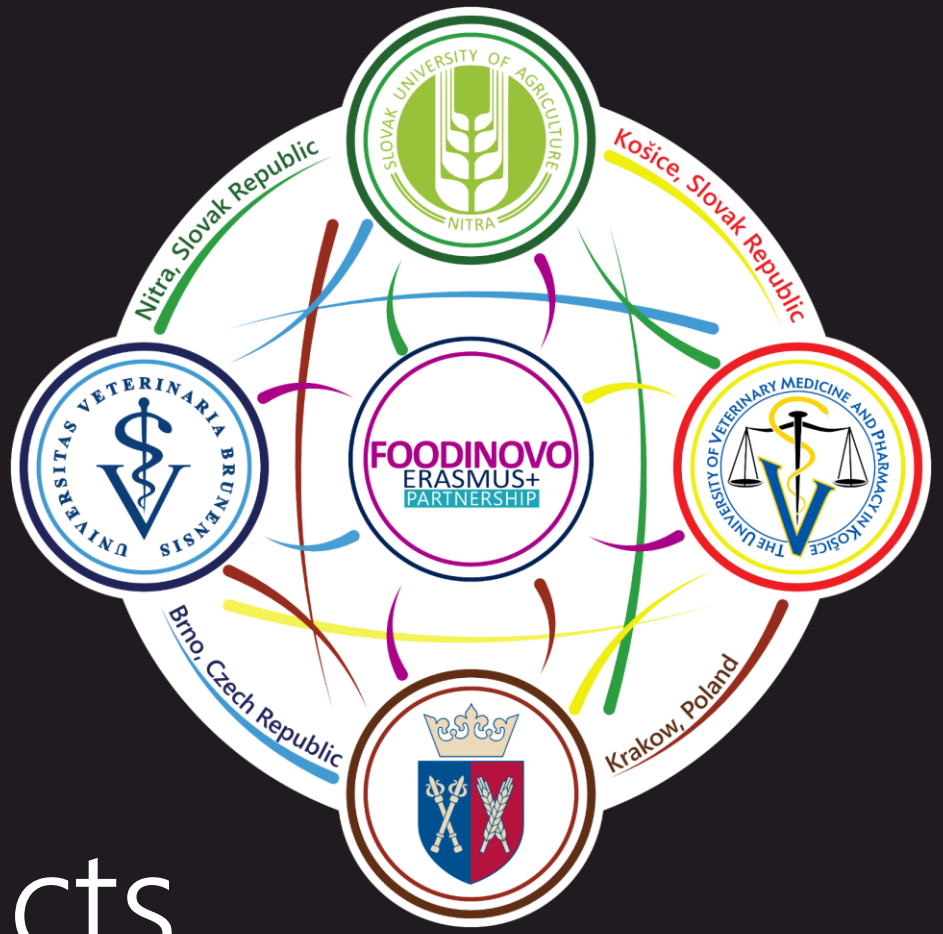
Flour quality control



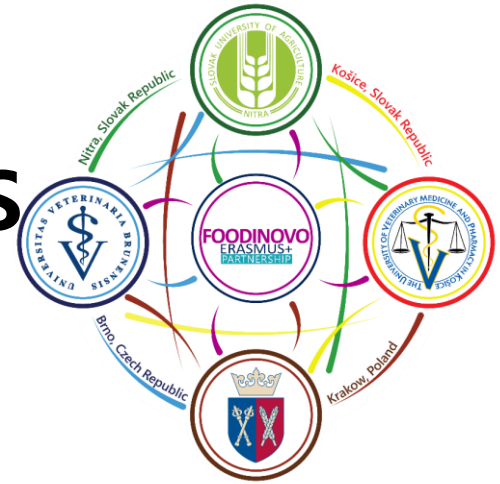
- Parameters are monitored:
- Moisture, falling number, amylograph, sedimentation index, ash, wet gluten

Hygiene requirements for food of plant origin

Bakery and confectionery products



Bakery and confectionery products

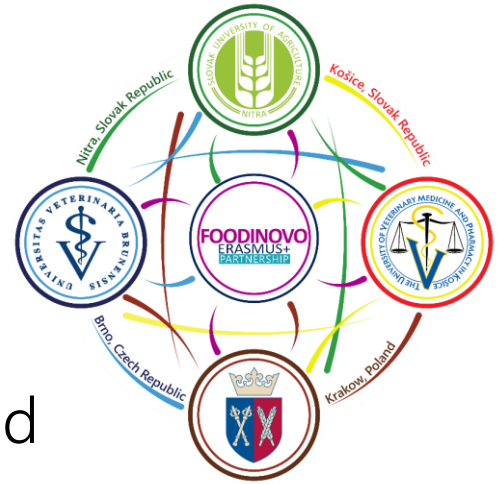


- Storage of eggs separately from other raw materials
- Eggs cracking separate from the production of bakery and confectionery products
- Eggshells – rendering plant
- Control – pests (traps, extermination)
- Separate storage of raw materials and production of gluten-free products and other allergens

Hygiene requirements for food of plant origin

Coffee and Related Products

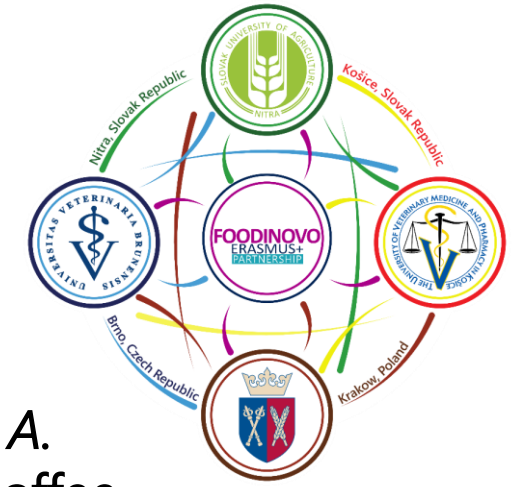
Hygiene requirements applied to coffee



- Coffee has to be free from chemical contaminants, mycotoxins and microorganisms.
- It is not possible to rely on roasting to destroy all potential contaminants.

- **Hygiene should be insured in all phases:**
  - Postharvest processing
  - Storage and transport
  - Roasting and caffeine removal
  - Coffee beverage preparation in commercial food and beverage service sector

Ochratoxin A (OTA)



- Green coffee beans are prone to fungal attack.
- Aspergillus species such as *Aspergillus carbonarius, A. niger, A. ochraceus* and *A. westerdijkiae* are the most widely OTA producers in tropical and semi-tropical coffee plantations.
- Consequence of inadequate drying or rehydration during any of the phases of storage or transportation
- OTA displays a vast toxicity, including neurotoxic, teratogenic, immunotoxic, carcinogenic, hepatotoxic, embryotoxic and especially nephrotoxic activity.

- Commission Regulation (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006

Ochratoxin A (OTA)

Prevention: Good agriculture and postharvest practices

- Education of farmers
- Sorting out green, yellow and defective beans
- Rapid drying (prevention of bean sweating, wetting)
- Cleanliness of the equipment, (using clean tarps for covering)
- Storage in clean, dry and well ventilated storage places
- Using of waterproof and durable packaging materials
- OTA levels monitoring
- **Roasting can be regarded as an additional safety barrier because a huge amount of OTA is lost during this process.**

Ochratoxin A (OTA)

Commission Regulation (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006

OchratoxinA in some food	maximum level (µg/kg)
Dried vine fruits nad dried figs	8,0
Other dried fruits	2,0
Dried herbs	10,0
Ginger roodt	15
Unprocessed cereal grains	5,0
Bakery wares, cereal snacks and breakfast cereals products not containing oilseeds, nuts or dried fruits	2,0
Bakery wares, cereal snacks and breakfast cereals products containing at least 20 % dried vine fruits and/or dried figs (and others)	4,0 (3,0)

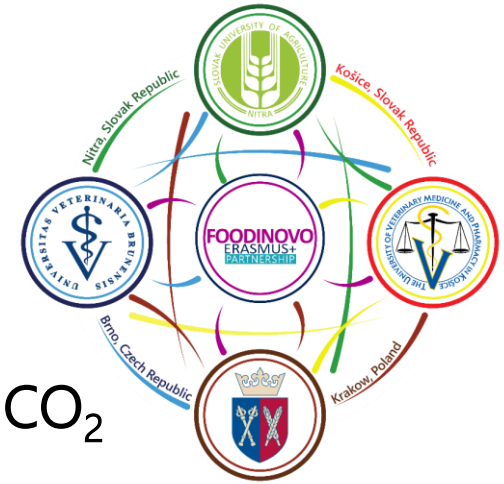
Acrylamide, furan and furfural derivatives

- **Thermal processing contaminants**, formed within a highly complex reaction network that occurs during coffee roasting.
- The most notable of these is acrylamide: formed by the degradation of free asparagine in the presence of sugars.
- Acrylamide is classified as a probable human carcinogen.
- Coffee beverages are important contributor to the exposure to acrylamide following potato and cereal products.
- **Commission Regulation (EU) 2017/2158 of 20 November 2017 establishing mitigation measures and benchmark levels for the reduction of the presence of acrylamide in food**
  - Benchmark levels of 400 µg/kg for roasted coffee and 800 µg/kg for instant coffee were determined.
  - There is no maximum limit, but the manufacturers should at least be able to demonstrate that they follow good manufacturing practices to keep acrylamide lower.

Acrylamide, furan and furfural derivatives

- No agronomic approaches for avoiding the accumulation of excessive asparagine in coffee beans have been revealed yet. The choice of raw materials is important to control asparagine in coffee, and thus acrylamide after roasting.
- Robusta beans (*Coffea canephora*) produce more acrylamide (up to two times) than arabica beans (*Coffea arabica*)
- No clear provisions how to decrease these processing contaminants, further research is needed. Current provisions have only limited effect:
  - Sorting out immature beans (contain higher amounts of asparagine)
  - Dark roast coffees have lower levels of acrylamide, but in this case some other thermal processing contaminants are known to have higher levels. Acrylamide decreases during storage of roasted coffee, but this should not be seen as a strategy as there is also a change in flavor.
  - Vacuum roasting of coffee to a medium roast degree has been shown to decrease acrylamide formation 50% compared with conventional roasting without affecting sensory properties.
- Moderate consumption is not considered harmful.

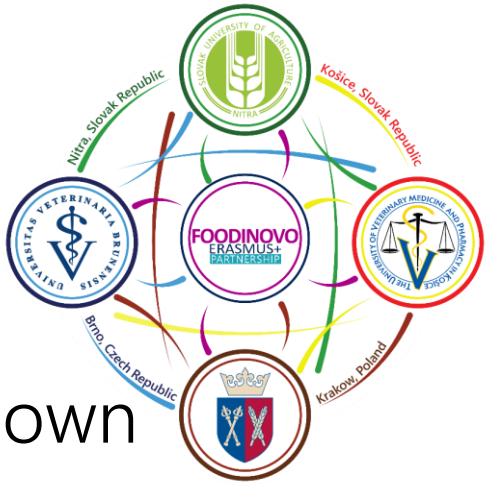
Potential contaminants of decaffeinated coffee



- **No potential health risks caused by Swiss water process or supercritical CO_2 caffeine extraction.**
- Chemical methods raise concerns:
  - dichloromethane
  - ethyl acetate

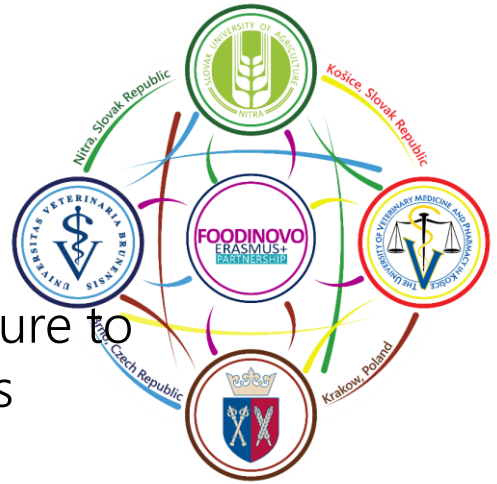
- Residual traces of organic solvents.
- No legislative obligation to include information about the used decaffeination method on the packaging.
- **Decree No. 253/2018 Coll., on requirements for extraction solvents used in the production of foodstuffs**

Maintenance, cleaning and sanitizing of roasting machines



- Daily contact with dust, smoke and oils – risk of a breakdown or fire
- Development of sufficient cleaning frequency according to the roasting profiles and oil buildup:
  - **emptying the chaff bucket**
  - **checking the cooling tray and ensuring that no holes are clogged up**
  - **wiping down the roaster and keeping the area around it clean**
  - cleaning and sanitizing high touch areas

Hygiene and safety in roasteries

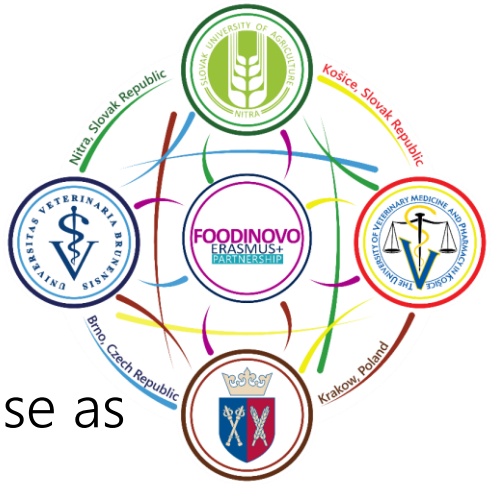


- The Centers for Disease Control and Prevention (CDC) identifies a risk of exposure to coffee dust, carbon monoxide, carbon dioxide, and volatile organic compounds (diacetyl and acetyl propionyl).
- **Exposure to these substances has been linked to respiratory diseases** including obliterative bronchiolitis, an irreversible form of lung disease also known as popcorn lung.
- **Sensitisation to green coffee beans is also a recognised hazard in a roastery.**

Measures:

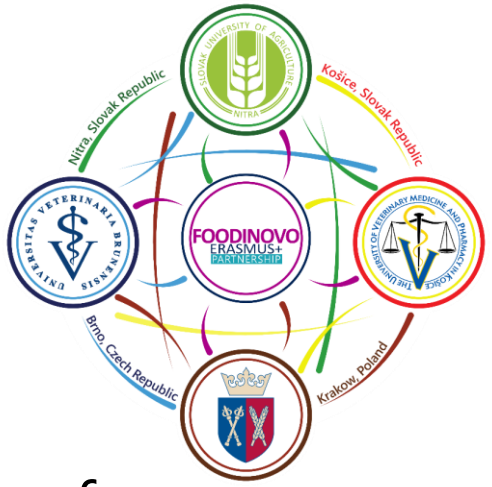
- adequate ventilation and dust monitoring
- keeping equipment maintained and space clean
  - using of masks and gloves to further reduce exposure
- training staff members
- appointing a member of staff to monitor health and safety

Beverage preparation hygiene



- If the coffee machine is not cleaned regularly, hygiene problems may arise as the machine deals with foodstuffs.
- Lingering grinds and accumulated oils will produce overextracted taste, over time it could cause dirty rancid taste.
- **Water used to make espresso is not quite at boiling temperature, so bacteria won't be killed by simply flushing through with water.**
- Inadequate cleaning and sanitation: residues of chemicals in the machine from improper back-flushing or over use of chemical – coffee with chemical taste
- **European standard EN 16889 - "Food hygiene - Production and dispense of hot beverages from hot beverage appliances - Hygiene requirements, migration test"**

Current situation in the field of coffee quality on Czech market



- Testing of processing and other contaminants in samples of instant, ground, roasted coffee and coffee capsules performed in February 2022:
  - no product with problematic level of solvent residues
  - more products with higher levels of acrylamide and furan
  - no significant problems with pesticide residues, OTA or PAHs (Polycyclic Aromatic Hydrocarbons)

Hygiene requirements for food of plant origin

Confectionery

Good Manufacturing and Hygiene Practices

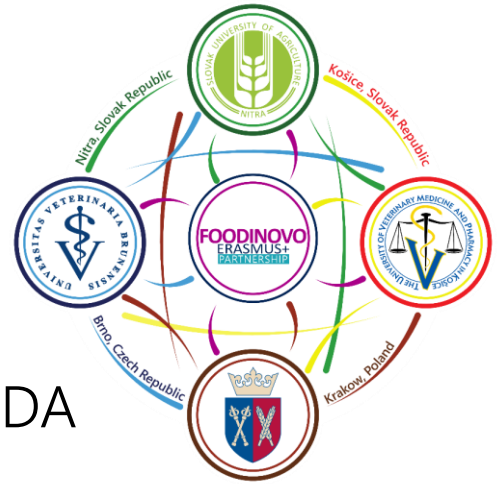
Good Manufacturing Practices (GMP) for confectionery:

- ensures safety of food
- Adherence to all laws of modified production procedures and requirements and the application of technical, technological and hygienic rules corresponding to generally accepted scientific knowledge for the achievement of healthy products

Food hygienic

- All the measures and rules necessary for the production of healthy and quality

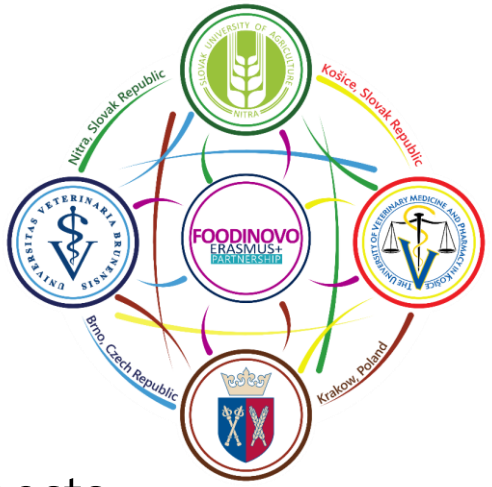
Good Manufacturing and Hygiene Practices



- The aim of the Codex Alimentarius or the Code of Hygiene Practice of FDA (General Requirements for Food Manufacture) is to guarantee constant quality of food producing industry.
- The concepts of quality assurance is varying depending on the areas of food production.
- The requirements with regard to buildings, production plants, process technology, distribution and personnel hygiene.
- The principles of the HACCP* are used

*HACCP - Hazard Analysis and Critical Control Points

Legislative requirements



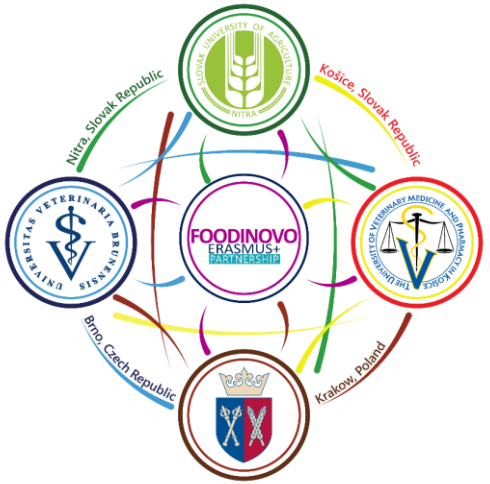
IN THE PRODUCTION OF CONFECTIONERY, PARTICULAR ATTENTION IS PAID TO:

- *Receiving and dosing of raw materials for production* - sensory control (pests, fungi, odor), shelf life, dosing of additives.
- *Cooling equipment* - temperature
- *Handling* - storage time and temperature

The basic production process of sugar-based candies:

Mixing (sucrose + water + glucose syrup), **dissolving, cooking** (evaporating), **coloring and flavoring, cooling and crystallization** (cooling and whipping, sucrose starts crystallizing), **forming** (cutting), **packaging**

Legislative requirements



POTENTIAL HEALTH HAZARDS CONFECTIONERY IN THE PRODUCTION OF

- *Contamination from raw materials* – microbial, chemical and physical
- *Non-compliance with the technological processes* – e.g. temperature
- *Non-compliance with hygiene rules in production*
- *Allergens* – e.g. nuts, milk
- *Crossing paths* – raw materials, products and packaging
- *Hazard Management* – controls

Legislative requirements

IN THE PRODUCTION OF CONFECTIONERY, PARTICULAR ATTENTION IS PAID TO:

BASIC INGREDIENTS FOR CONFECTIONERY

- **Sweeteners** – sucrose, glucose, glucose syrup, fructose, invert sugar, sugar alcohols, etc.
- **Hydrocolloids** – starches, pectin, gelatin, gums
- **Proteins** – milk, eggs, soy protein
- **Fats** – butter, oil, margarine
- **Emulsifiers** – lecithin, glycerol monostearate
- **Flavouring and colouring agents**
- **Acids –** citric acid, tartaric acid, malic acid…
- **Nuts, fruits**
- **Other ingredients** – antioxidants, waxes etc.

Legislative requirements

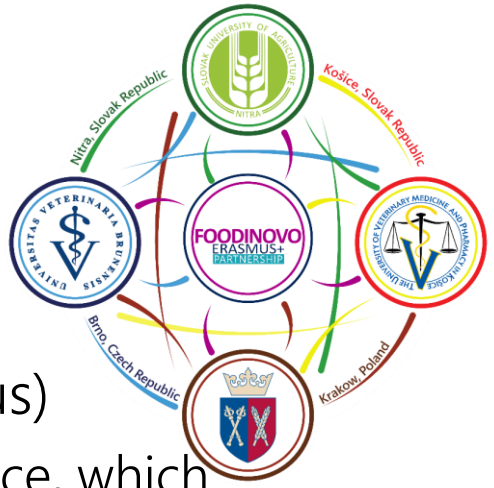
IN THE PRODUCTION OF CONFECTIONERY, PARTICULAR ATTENTION IS PAID TO:

BASIC INGREDIENTS OF CONFECTIONERY

- Food additives
  - any substance not normally consumed as a food
  - the intentional addition to food for a technological (including organoleptic) purpose in the manufacture, processing, preparation, treatment, packing, packaging, transport or holding
  - the term does not include contaminants or substances added to food for maintaining or improving nutritional qualities

❖ have been assigned an Acceptable Daily Intake (ADI)

Legislative requirements



Good Manufacturing Practice (GMP) of Food additives (Codex Alimentarius)

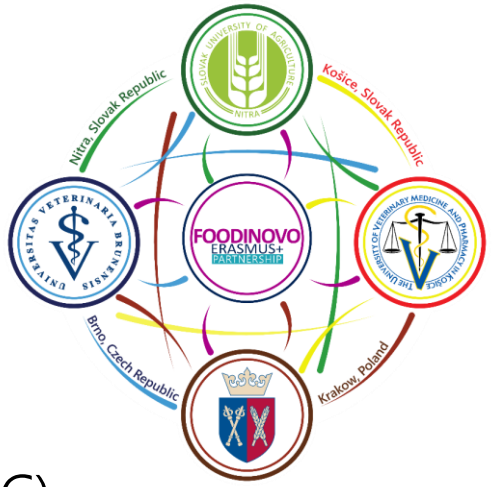
- All food additives shall be used under conditions of good manufacturing practice, which include the following:

  a) The quantity of the additive added to food shall be limited to the lowest possible level necessary to accomplish its desired effect;

  b) The quantity of the additive that becomes a component of food as a result of its use in the manufacturing, processing or packaging of a food and which is not intended to accomplish any physical, or other technical effect in the food itself, is reduced to the extent reasonably possible;

  c) The additive is of appropriate food grade quality and is prepared and handled in the same way as a food ingredient

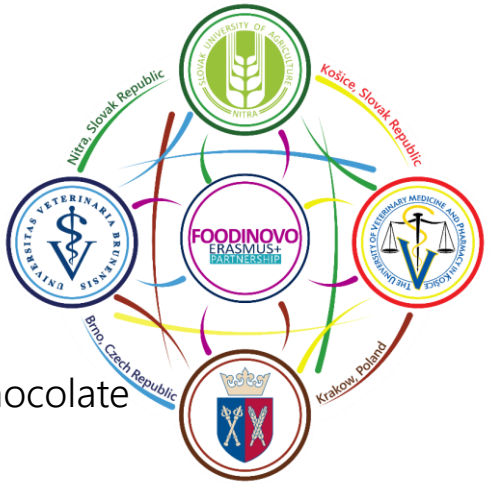
Legislative requirements



- CHOCOLATE-BASED CONFECTIONERY (MIN. 5% OF COCOA COMPONENTS)

  Directive relating to cocoa and chocolate products (Directive 2000/36/EC)

Legislation applied to cocoa and chocolate products



Directive 2000/36/EC of the European Parliament and of the Council of 23 June 2000 relating to cocoa and chocolate products intended for human consumption

Cocoa butter: designates the fat obtained from cocoa beans or parts of cocoa beans with the following characteristics: free fatty acid content (expresssed as oleic acidp not more than 1.75% unsaponifiable substances (determined using petroleum ether): not more than 0.5% except for pressed cocoa butter,, where it may not be more than 0.35%

Cocoa powder, cocoa: designate the product obtained by converting into powder cocoa beans which have been cleaned, shelled and roasted, and which contains not less than 20 % cocoa butter, calculated according to the weight of the dry matter, and not more than 9 % water

Powdered chocolate, chocolate in powder: designate the product consisting of a mixture of cocoa powder and sugars, containing not less than 32 % cocoa powder;

Drinking chocolate, sweetened cocoa, sweetened cocoa powder: designate the product consisting of a mixture of cocoa powder and sugars, containing not less than 25 % cocoa powder; these names shall be accompanied by the term "fat-reduced" in the case where the product is fat-reduced as defined at fat reduced cocoa

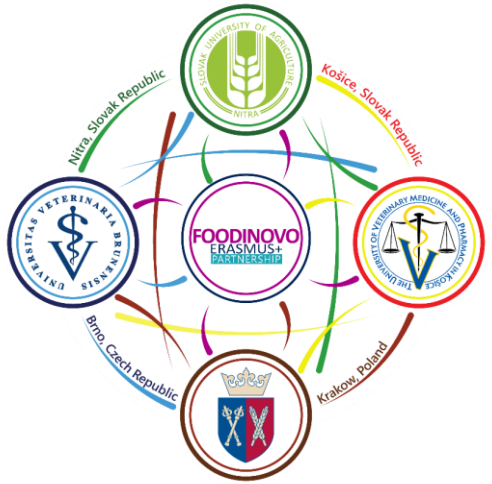
Legislation applied to cocoa and chocolate products

Directive 2000/36/EC of the European Parliament and of the Council of 23 June 2000 relating to cocoa and chocolate products intended for human consumption

The vegetable fats other than cocoa butter as defined in Annex II (Illipe, Borneo tallow or Tengkawang, Palm-oil, Sal, Shea, Kokum gurgi, Mango kerne) and listed therein may be added to those chocolate products: chocolate, milk cocolate, family milk chocolate, white chocollate,chocolate a la taza and Chocolate familiar a la taza.

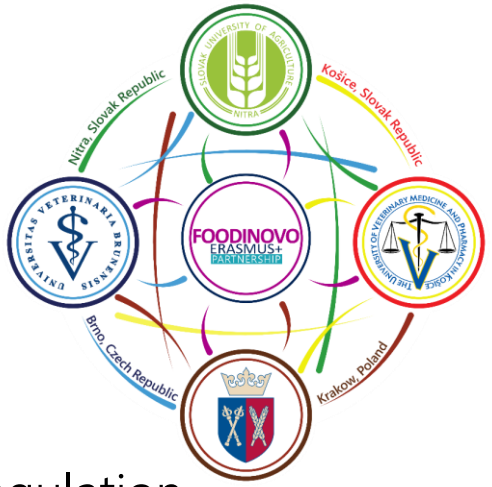
That addition may not exceed 5 % of the finished product, after deduction of the total weight of any other edible matter used in accordance with Annex I(B), without reducing the minimum content of cocoa butter or total dry cocoa solids.

Legislative requirements



- SUGAR-BASED CONFECTIONERY (MAX. 5% OF COCOA COMPONENTS)
  - Food Additives and sweeteners (Regulation (EC) No 1333/2008) (see Legislative requirement for platn origin foodstuff)
  - Flavourings (Regulation (EC) No 1334/2008)

Legislative requirements



- SUGAR-BASED CONFECTIONERY (MAX. 5% OF COCOA COMPONENTS)
  - Food information to consumers (Labelling of confectionery containing licorice) (Regulation (EC) No 1169/2011)
  - Confectionery or beverages containing glycyrrhizinic acid or its ammonium salt due to the addition of the substance(s) as such or the liquorice plant Glycyrrhiza glabra, at concentration of 100 mg/kg or 10 mg/l or above: '**contains liquorice**' shall be added immediately after the list of ingredients, unless the term 'liquorice' is already included in the list of ingredients or in the name of the food. In the absence of a list of ingredients, the statement shall accompany the name of the food
  - Confectionary containing glycyrrhizinic acid or its ammonium salt due to the addition of the substance(s) as such or the liquorice plant Glycyrrhiza glabra at concentrations of 4 g/ kg or above: „**contains liquorice – people suffering from hypertension should avoid excessive consumption**" shall be added immediately after the list of ingredients. In the absence of a list of ingredients, the statement shall accompany the name of the food

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

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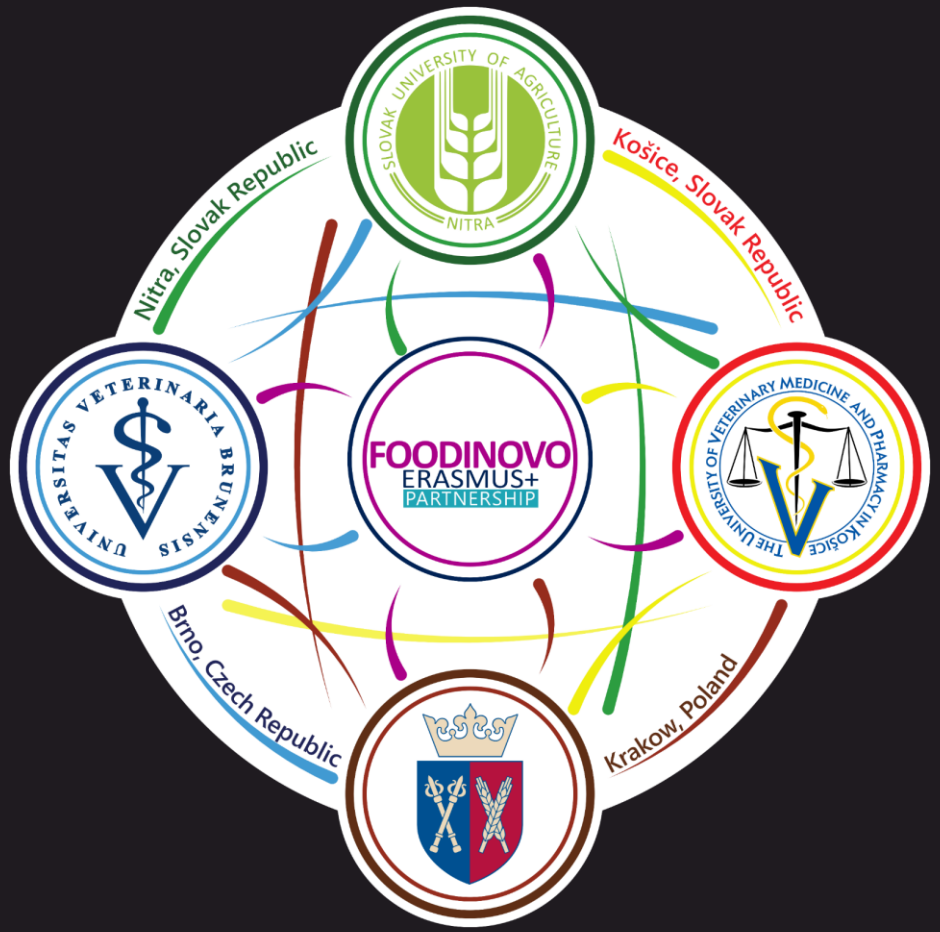
Inovácia štruktúry a obsahového zamerania študijných programov profilujúcich potravinárske študijné odbory s ohľadom na digitalizáciu výučby

FOODINOVO | 2020-1-SK01-KA203-078333



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