

**Nutritional and biological value
of food-stuffs. Food safety.**

The plan

- 1. Classification of foods.**
- 2. Food safety.**
- 3. Characterization of different foods.**
- 4. Contaminants and food additives.**
- 5. Prophylaxis of food poisoning**

I. Classification of foods

A. Food classification (by origin)

- 1. Food-stuffs of animal origin.**
- 2. Food - stuffs of vegetable origin.**
- 3. Foodstuffs of mixed origin.**
- 4. Beverages.**
- 5. Spices.**

B. Classification of food products according to the results of the food expertise

- 1. Edible foods** - they can be consumed without restrictions, because they are in fully compliance with the requirements of normative documents.
- 2. Conditioned edible foods** - they have such shortcomings, which make it impossible to use them in food without special preliminary processing.
- 3. Inedible foods** - they have such shortcomings, due to which it is not possible to use them in food even after a special processing.

II. Food safety

Alteration ways of food

1. Rot

2. Fermentation:

a) alcoholic fermentation

b) lactic acid fermentation

c) acetic acid fermentation

d) butyric acid fermentation

3. Oxidation and grinding

4. Mold

II. Food safety (continuation).

The directions of measures, which ensure food safety:

- 1. The measures aimed at the objectives.**
- 2. The measures aimed at the personnel of the objectives.**
- 3. Measures aimed at the finished product**

II. Food safety (continuation)

The purpose of hygienic expertise of foods -

Evaluation of the properties, which characterize the nutritional value and harmlessness of food for the human body.

II. Food safety (continuation)

The tasks of expertise

- 1. To determine the deviations of the organoleptic properties of the foods, the character and the degree of gravity of these deviations.**
- 2. To establish the degree of microbial contamination of foods and the character of the microbial flora.**
- 3. To determine the presence of residual quantities of pesticides, food additives and toxic substances in quantities that exceed the maximum permitted limits.**

II. Food safety (continuation)

The tasks of expertise(continuation)

4. To determine the possibility of transmission by contaminated foods of the various germs (based on concrete epidemiological data);

5. To evaluate the production conditions and the sanitary regime of the food objectives, the hygienic conditions of storing and transporting of foods, conditions that could cause changes in organoleptic properties, chemical composition and microbial contamination

III. Characterization of different foods

Chemical composition of cereals and dried legumes

- ***Cereal crops* (wheat, rye, oats, corn, millet, buckwheat, oats, sorghum) contain 37.6 - 59.6% carbohydrates, 7.5 - 13.0% protein, 2.2 - 6.2% of lipids and 13.0 - 14.0% of water. Dried legumes (beans, peas, kernels, lentils, nuts, soy) contain 9.2 - 48.6% carbohydrates, 20.5 - 34.9% protein, 1.5 - 17.3% lipids and 10 , 0 - 14.0% water. In general, however, the chemical composition of different types of dried cereals and legumes can be influenced by both the variety of species and the climatic-geographical conditions, soil composition, etc.**

Chemical composition of cereals and dried legumes (continuation)

- ***Wheat***, the main bread-making cereal crop, has been known to man for hundreds of thousands of years. Due to the gluten, the protein part of the grain, which allows the production of flour foods based on the porous dough, the wheat presents the basic material of a significant number of foods.
- The ***rye is*** usually cultivated in certain regions, where the climatic - geographical conditions are less favorable. With a lower protein and carbohydrate content than wheat and the energy value of the rye is slightly lower. Rye is less valuable also due to the content of some mineral elements (K, Mg) and vitamins (B1, B2).

Chemical composition of cereals and dried legumes (continuation)

- **Corn** is a culture originally from America. Corn is used in the manufacture of flour and expanded products (corn flakes). Besides this, corn is obtained by industrial methods, starch and dextrin. Corn kernels (up to a certain stage of development) can be preserved or consumed cooked. The oil is extracted from the corn embryo, considered a product of great biological value due to the composition of fatty acids.
- **Oats** are distinguished by their richness in cellulose (10.7%) and lipids (6.2%). Compared to all other cereals, the content of proteins and carbohydrates is lower in it, having a lower energy value. In the form of flakes and brisket, oatmeal is often recommended in dietary nutrition.

Bread

One of the great scientists in the field of agrarian sciences *Kliment A. Timireazev* said that "*a slice of well-baked bread is one of the greatest inventions of the human mind.*" For the first time the bread was attested to the Egyptians 3,000 years ago i.e. Bread is a good source of protein, it contains vitamins, especially from group B, iron and calcium. Whole grain wheat bread has a high dietary fiber content. However, there are many nutrients that are lacking in this food, which means that a human cannot live with just that. An average slice of white bread has 80 calories, and a slice of rye bread - 65 calories.

MILK AND DAIRY PRODUCTS

Structurally, milk has a very complex physico-chemical system, which can be considered as a fat emulsion in a colloidal solution. For both mammals and humans, milk serves as an exclusive food in the first stage of life, having a special nutritional value. Appreciating the nutritional value of milk, academician *I. P. Pavlov* said, "*this is an amazing product created by nature itself*". The value of milk is due to the fact, that it contains almost all the nutrients and biologically active substances necessary for the body, the optimal balance between them and, to a large extent, their digestibility and their degree of assimilation.

MILK AND DAIRY PRODUCTS(continuation)

In most countries of the world the most widespread is cow's milk. The dry substance in cow's milk is 12.7%. The share of proteins is 3.4%, including casein - 2.8% and whey proteins - 0.67%, the average weight of lipids is 3.7% and lactose - 4.8%. In sheep's milk the content of the dry substance is higher - 19.3%, the share of proteins is 5.5%, including casein - 4.6% and whey proteins - 0.9%, the average weight of lipids is 7.4 %, and lactose - 4.8%, as in cow's milk. Content rich in energy-rich substances has reindeer milk: dry substance - 33.1%, protein - 11.5%, lipids - 16.9%, lactose - 2.8%

MILK AND DAIRY PRODUCTS(continuation)

- **Casein, the main milk protein, has a phosphoprotein, in the structure of which phosphoric acid forms complexes with oxyamino acids, but also with calcium and phosphorus macro-elements, leading to their bioavailability. Casein is found in three forms: α , β and γ . The weight of these forms is 55%, 30%, and 15%, respectively. In case of cow cheese, casein is precipitated by acidification when the active acidity reaches the isoelectric point (pH 4.6). Casein precipitation may also occur enzymatically under the action of the coagulating enzyme. The other two milk proteins, also called whey proteins, do not precipitate when cheese is formed**

CHEMICAL COMPOSITION OF MILK OF DIFFERENT ORIGIN(%)

Origin	Dry Subst.	Lipids	Proteins general	Casein	Whey proteins	Lactose	Ash
Cow's milk	12,7	3,7	3,4	2,8	0,6	4,8	0,7
Sheep's milk	19,3	7,4	5,5	4,6	0,9	4,8	1,0
Goat milk	13,2	4,5	2,9	2,5	0,4	4,1	0,7
Donkey milk	8,5	0,6	1,4	0,7	0,7	6,1	0,4
Mare's milk	11,2	1,9	2,5	1,3	1,2	6,2	0,5
Camel milk	15,6	4,5	3,6	2,7	0,9	5,0	0,7
Reindeer milk	33,1	16,9	11,5	8,7	1,8	2,8	1,4
Human milk	12,4	3,8	1,0	0,4	0,6	7,0	0,2

Classification of acid dairy products

- A. Acid dairy products of pure fermentation
(sour milk, sour cream, yogurt, cow cheese
and others)**
- B. Acid dairy products of mixed fermentation
(kefir, kumis and others)**

ASSIMILATION OF MILK AND YOGURT(%)

Time, hours	Milk	Yogurt
1	32	91
2	36	92
3	41	95,5

Meat

- Under the name of *meat* are included all the tissues and organs consumed by humans, obtained from domestic or wild mammals and birds.
- *Meat* - edible parts of domestic animals (bovine, swine, sheep, goat) and poultry, slaughtered in the form of carcasses or parts of carcasses, consisting of muscle tissue, adipose tissue, connective tissue with / or without bone tissue

Meat (continuation)

- **Meat is an important source of energy and nutrients for humans. Thanks to the balanced chemical composition in nutrients with high biological value (proteins, fats, minerals and vitamins), higher digestibility and dietary-culinary potential, meat is considered an indispensable food in human nutrition.**

Factors that influence meat quality

- **Species,**
- **Race,**
- **Age,**
- **Gender,**
- **Nutrition,**
- **Health status,**
- **The conditions of slaughter,**
- **Conservation and preservation.**

Chemical composition and energy value of certain types of meat

Nr d/r	Meat	Chemical composition, g/100g of meat				Energy value, Kcal/100g
		Water	Proteins	Lipids	Mineral salts	
1.	Beef, cat.I	64,5	18,6	16,0	0,9	218
2.	Beef, cat.II	69,2	20,0	9,8	1,0	168
3	Pork for bacon	54,2	17,0	27,8	1,0	318
4	Fat pork	38,4	11,7	49,3	0,6	491
5.	Sheep meat, cat.I	67,3	15,6	16,3	0,8	209
6.	Sheep meat,cat.II	69,7	19,8	9,8	0,9	166
7.		66,7	21,1	11,0	1,2	138

Chemical composition and energy value of some types of poultry meat

Nr d/r	Meat	Chemical composition g/100g de produs					Energy value Kcal/100g
		Apă	Proteine	Lipide	Glucide	Săruri minerale	
1.	Chicken meat,cat.I	61,9	18,2	18,4	0,7	0,8	241
2.	Chicken meat,cat.II	69,1	21,2	8,2	0,6	0,9	161
3.	Chicken - broiler, cat.I	63,8	18,7	16,1	0,5	0,9	183
4.	Chicken – broiler, cat.II	67,7	19,7	11,2	0,5	0,9	127
5.	Duck meat,cat.I	45,6	15,8	38,0	-	0,6	405
6.	Duck meat,cat.II	56,7	17,2	24,2	-	0,9	287
7.	Goose meat,cat.I	45,0	15,2	39,0	-	0,8	412
8.	Goose meat,cat.II	54,4	17,0	27,7	-	0,9	317
9.	Turkey meat,cat.I	57,3	19,5	22,0	-	0,9	276
10.	Turkey meat,cat.II	64,5	21,6	12,0	0,8	1,1	197

PRINCIPLES OF PRESERVATION

- ***Biosis*** - maintenance of vital processes, use for the purpose of preserving food of its own immunity.
- ***Anabiosis*** - repression of the vital activity of microorganisms and food additives
- ***Abiosis*** - complete suspension of the activity of microorganisms and destruction of the fermentes.
- ***Cenoanabiosis*** - repression of harmful microorganisms with the help of useful ones.

Classification of food preservation methods

- **1. The action of high temperatures:**
- **2. The action of low temperatures**
- **3. Dehydration**
- **4. Preservation with ionizing rays and ultraviolet radiation**
- **5. Preservation by increasing osmotic pressure**
- **6. Preservation by changing the concentration of hydrogen ions**
- **7. Preservation with the help of chemical and biological substances**
- **8. Combined methods of preservation**

Food preservation methods (continuation)

1. The action of high temperatures:

1.1. Pasteurization

1.1.1. Low pasteurization at 60-65 °C for 20-30 minutes

1.1.2. The middle pasteurization at 70-80 °C for a few tens of seconds

1.1.3. High or instant pasteurization at temperatures of 85-90 °C for a few seconds

Food preservation methods (continuation)

- **1.1.4. Multiple or fractional pasteurization (2 - 4 times) with the interval between 24-hour procedures (tyndallization)**
- **1.1.5. HTST pasteurization (High temperature short time - High temperature and short duration heat treatment)**
- **1.1.6. Ultra-pasteurization (heating of liquids by injection with superheated water vapor at temperatures of about 150 °C for one second and immediate aseptic packing)**

Food preservation methods (continuation)

- **1.2. Sterilization (most commonly at temperatures of 115 - 120 oC and above)**
- **1.2.1. Sterilization at very high temperatures or UHT (UHT) consists of heating the product to 135 - 138 oC for 2 - 3 seconds with subsequent packaging in pre-sterilized containers.**
- **1.2.2. Sterilization with high and very high frequency currents**
- **1.2.3. Ultrasonic sterilization (where frequency greater than 20 kHz)**
- **1.3. Blanching**

Food preservation methods (continuation)

- **2. The action of low temperatures**
- **2.1. Refrigeration**
- **2.1. Freezing**
- **3. Dehydration**
- **3.1. Natural sun drying**
- **3.2. Artificial drying in enclosed spaces**
- **3.3 Artificial dehydration in vacuum**
- **3.4. Freeze drying or sublimation.**

Food preservation methods (continuation)

4. Preservation with ionizing rays and ultraviolet radiation

4.1. Radapertization or complete sterilization (1-2.5 Mrad)

4.2. Radurization or moderate sterilization (0.5-0.8 Mrad)

4.3. Radicidation or pasteurization (0.3-0.5 Mrad)

4.4. Preservation with ultraviolet radiation

5. Preservation by increasing osmotic pressure

5.1. Salting

5.2. Preservation with sugar

6. Preservation by changing the concentration of hydrogen ions

6.1. Marinating

6.2. Pickling

Food preservation methods (continuation)

- **7. Conservation with the help of chemical and biological substances.**
- ***7.1. Antiseptic substances* (in the Republic of Moldova more often sulfur dioxide, sulfuric acid, benzoic acid and sorbic acid with their derivatives, some antioxidants)**
- ***7.2. Antibiotics***
- **8. Combined methods of preservation**
- ***8.1 Smoking* (the complex action of the salt, the partial dehydration during the heat treatment together with the antiseptic action of the smoke).**
- ***8.2. Preservation without the action of high temperatures, the cans being hermetically sealed***

Nutritional value of vegetables and fruits

- **A. Water**

- a) Vegetables: 64-96%, of which the lowest water content is in garlic (64-74%), and the largest - beetroot (96%)
- b) Fruits: 75-92%, gutters, apples and pears containing the lowest percentage of water (79-88%), and peaches and strawberries the highest (92%)

- **B. Proteins**

- a) Vegetables: 0.5-1.5%, except - legumes - soy, for example, - 34.5%
- b) Fruits: 0.5-2.0%, except - fruit nuts (ordinary walnuts - 15.6%.

Nutritional value of vegetables and fruits (continuation)

- **C. Lipids**

- Lipid content is very low (0.1-0.7%) with the exception of nuts (50-71%), the seeds of some vegetables, such as pumpkin seeds (35-47%).

- **D. Carbohydrates**

- a) *Vegetables* contain, on average, 3-4% carbohydrates, but these quantities vary in a fairly wide range (2.8% -22.4%). The carbohydrate content in vegetables is higher in carrots (8%) and beets (10.8%), watermelons (8.7%) and yellow melons (9.0%) .A considerable source of carbohydrates is potatoes due to their high starch content (up to 20%). Vegetable carbohydrates are presented, in particular, by starch and less - by sugars, with the exception of beets, carrots and melons, where they predominate (sucrose). Sugar beet contains 20% sucrose. In the watermelons, fructose is predominant

Nutritional value of vegetables and fruits (continuation)

- b) Fruits and berries contain much higher amounts of *carbohydrates* (on average 10%). In fruits, sugars (glucose, fructose, sucrose) are well presented. Fructose predominates in most fruits.
- *Dietary fibers* are well presented in vegetables and fruits, being presented by cellulose, hemicellulose, inulin, pectins, gums, and mucilages. Unlike cereal cellulose, vegetables and fruits have a finer structure with the characteristic of partial cleavage in the intestines into soluble substances

Nutritional value of vegetables and fruits (continuation)

- **E.Vitamins**
- Fruits and vegetables are very rich sources of various vitamins. They are the main sources of vitamin C and K and the only source of vitamin P.
- Vegetables and fruits in the ordinary daily ration cover up to 30% of the body's need for vitamins in group B. Important sources of vitamins B1, B2 B6 are green peas, beans, potatoes, cabbage. Besides the mentioned vitamins cabbage, peas, spinach and other vegetables are relatively rich sources of tocopherol. Fruits, vegetables, berries cover 20-30% of the body's needs in vitamin E.
- At the same time, vegetables and fruits are very poor in vitamin B12, which should be taken into account when it comes to strict vegetarian nutrition. Only peas contain some slightly higher amounts of this vitamin.

Nutritional value of vegetables and fruits (continuation)

- **F. Mineral salts.**
- The biological value of vegetables, fruits and apples is largely due to mineral salts, their total content being 0.5-2.0%. In this group of foods are very well presented alkaline macro-elements K, Mg, Ca which play a special role in maintaining the basic acid balance of the human body.
- *Potassium* is well presented in most of these foods. Of the high potassium vegetables it is found in potatoes (568mg%). All fruits contain potassium, but especially dried fruits, for example dried apricots contain 1717mg%, dried plums - 864mg%, raisins - 860mg%

Nutritional value of vegetables and fruits (continuation)

- ***Magnesium*** content is found in the majority of vegetables and fruits in the range 8-57mg%, rich sources being spinach, parsley, green peas, beets and potatoes. A very rich source of magnesium (224mg%) is considered watermelon. In the green parts of vegetables, magnesium enters the composition of chlorophyll. Under the influence of acidic gastric juice, magnesium removal occurs.
- ***Calcium*** content is much lower compared to milk and dairy products: however, in many vegetables (salad, cabbage, green parsley, onion) calcium is found in an optimal ratio to phosphorus to be assimilated. The assimilation of calcium and magnesium takes place through the initial stage of the formation of hard-digested complexes and ultimately depends on several factors (content of phytates, oxalates, lipids, etc.).

Nutritional value of vegetables and fruits (continuation)

- A wide range of *microelements* is present in vegetables and fruits. Of these, for example, apples, peaches, apricots, plums, cherries, green parsley are considered rich sources of bioavailable iron. Hematopoietic action in many cases is also due to the concomitant presence of other mineral elements, which contribute to it. Thus, in the same apples besides iron (2.5mg%) it contains cobalt (0.58mg%) and manganese (0.15mg%). In strawberries besides iron (0.7% mg%) it contains cobalt (9.8mg%), manganese (0.59mg%) and copper (0.26mg%).
- According to the manganese content, the first place among the vegetables is occupied by the legumes. Thus, the content of this element in peas is 7mg%, in soy - 6mg%, beans - 4mg%. An appreciable source of manganese is also salad (7mg%), less - beet (2.3mg%)

Nutritional value of vegetables and fruits (continuation)

- **G. Organic acids.**
- ***Organic acids* stimulate the activity of the glands of the digestive tract, the most important being:**
- **1. Malic acid,**
- **2. Citric acid**
- **3. Tartaric acid**
- **4. Succinic acid**
- **5. Oxalic acid**
- **6. Benzoic acid**
- **7. Formic acid.**

IV. Contaminants and food additives.

A.Contaminants

FOOD – STUFF

A. Nutritive and biologic active substances.

B. The substances without biological value:

- 1. Antinutritive substances**
- 2. Toxic substances:**
 - a) of natural origin;**
 - b) pollutants, contaminants**

Groups of contaminants

- 1. Food additives that are not permitted or permitted food additives in high doses.**
- 2. The substances from food – stuffs obtained with new technologies or by utilization of the raw material of low quality.**
- 3. Pesticides in high doses.**
- 4. Substances in food –stuffs obtained in the result of irrational using of fertilizers or sewage.**
- 5. Substances remained in animal food –stuffs in the result of using of veterinary drugs, stimulators of growth.**
- 6. Substances from equipment, , instruments, dishes, wrapping.**
- 7. Substances in the result of usual technologies.**
- 8. Mycotoxins**
- 9. Substances in food-stuffs from the environment.**

Contamination of foods with toxic substances

Heavy metals and arsenic

Mercury

Minamata disease (,sometimes referred to as Chisso-Minamata disease is a neurological syndrome caused by severe mercury poisoning.

Symptoms include ataxia, numbness in the hands and feet, general muscle weakness, narrowing of the field of vision and damage to hearing and speech. In extreme cases, insanity, paralysis, coma, and death follow within weeks from the onset of symptoms. A congenital form of the disease can also affect fetuses in the womb.

Mercury (continuation)

- ***Minamata disease*** was first discovered in Minamata city in Kumamoto prefecture, Japan, in 1956. It was caused by the release of methylmercury in the industrial wastewater from the Chisso Corporation's chemical factory, which continued from 1932 to 1968. This highly toxic chemical bioaccumulated in shellfish and fish in Minamata Bay and the Shiranui Sea, which when eaten by the local population resulted in mercury poisoning. While cat, dog, pig, and human deaths continued over more than 30 years, the government and company did little to prevent the pollution. The animal effects were severe enough in cats that they came to be called "dancing cat fever."

Mercury (continuation)

The cause of this disease wasn't clear until March 1958, when visiting British neurologist Douglas McAlpine suggested that Minamata symptoms resembled those of organic mercury poisoning, that the focus of the investigation centered on mercury.

As of March 2001, 2,265 victims had been officially recognized (1,784 of whom had died) and over 10,000 had received financial compensation from Chisso. By 2004, Chisso Corporation had paid \$86 million in compensation, and in the same year was ordered to clean up its contamination. On March 29, 2010, a settlement was reached to compensate as-yet uncertified victims

A second outbreak of Minamata disease occurred in Niigata Prefecture in 1965. The original Minamata disease and Niigata - Minamata disease are considered two of the Four Big Pollution Diseases of Japan.

Contamination of foods with toxic substances

Heavy metals and arsenic

Cadmium

Acute exposure to ***cadmium*** fumes may cause flu like symptoms including chills, fever, and muscle ache sometimes referred to as "the cadmium blues." Symptoms may resolve after a week if there is no respiratory damage. More severe exposures can cause tracheobronchitis, pneumonitis, and pulmonary edema. Symptoms of inflammation may start hours after the exposure and include cough, dryness and irritation of the nose and throat, headache, dizziness, weakness, fever, chills, and chest pain.

Inhaling cadmium-laden dust quickly leads to respiratory tract and kidney problems which can be fatal (often from renal failure). Ingestion of any significant amount of cadmium causes immediate poisoning and damage to the liver and the kidneys. Compounds containing cadmium are also carcinogenic.

Contamination of foods with toxic substances

Heavy metals and arsenic

Arsenic

Arsenic is a metalloid and occurs in many minerals, usually in conjunction with sulfur and metals, and also as a pure elemental crystal. It can exist in various allotropes, although only the gray form has important use in industry.

The main use of metallic arsenic is for strengthening alloys of copper and especially leads (for example, in car batteries). Arsenic is used also in semiconductor electronic devices. Arsenic and its compounds, especially the trioxide, are used in the production of pesticides, treated wood products, herbicides, and insecticides.

Arsenic is notoriously poisonous to multicellular life, although a few species of bacteria are able to use arsenic compounds as respiratory metabolites. Arsenic contamination of groundwater is a problem that affects millions of people across the world.

Classification of pesticides

Type	Action
Algicides	Control algae in lakes, canals, swimming pools, water tanks, and other sites
Antifouling agents	Kill or repel organisms that attach to underwater surfaces, such as boat bottoms
Antimicrobials	Kill microorganisms (such as bacteria and viruses)
Attractants	Attract pests (for example, to lure an insect or rodent to a trap). (However, food is not considered a pesticide when used as an attractant.)
Biopesticides	Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals

Classification of pesticides (continuation)

Biocides	Kill microorganisms
Disinfectants and sanitizers	Kill or inactivate disease-producing microorganisms on inanimate objects
Fungicides	Kill fungi (including blights, mildews, molds, and rusts)
Fumigants	Produce gas or vapor intended to destroy pests in buildings or soil
Herbicides	Kill weeds and other plants that grow where they are not wanted
Insecticides	Kill insects and other arthropods
Miticides	Kill mites that feed on plants and animals

Acaricides	Algicides	Antifeedants
Avicides	Bactericides	Bird repellents
Chemosterilants	Fungicides	Herbicide safeners
Herbicides	Insect attractants	Insect repellents
Insecticides	Mammal repellents	Mating disrupters
Molluscicides	Nematicides	Plant activators
Plant growth regulators	Rodenticides	Synergists
Virucides	Miscellaneous	

Classification depending on the acute toxicity of pesticides entering the stomach(in dependence on DL₅₀)

- ☐ excessive toxicity – <50 mg / kg;**
- ☐ high toxicity - 50-200 mg / kg;**
- ☐ average toxicity - 200-1000 mg / kg;**
- ☐ low toxicity - > 1000 mg / kg;**

Classification of pesticides in dependence of their persistence in the environment (coefficient of persistence)

- ☐ Pesticides with excessive persistence <1 ;**
- ☐ Pesticide with high persistence - 1-3;**
- ☐ Pesticide with middle persistence - 3-5;**
- ☐ Pesticides with low persistence > 5 .**

NITRATES

Nitrate is a polyatomic ion with the molecular formula NO_3^-

Nitrate toxicosis can occur through of nitrate to nitrite being an intermediate. Nitrites oxidize the iron atoms in hemoglobin from ferrous iron (2+) to ferric iron (3+), rendering it unable to carry oxygen. This process can lead to generalized lack of oxygen in organ tissue and a dangerous condition called methemoglobinemia.

Methemoglobinemia in infants is known as blue baby syndrome.

Nitrates would most often be ingested by infants in high nitrate drinking water. However, nitrate exposure may also occur if eating, for instance, vegetables containing high levels of nitrate

The biological action of nitrates

- 1. Methemoglobinemia**
- 2. Teratogenic effect**
- 3. Mutagenic action**
- 4. Facilitate the emergence and development of goiter (in experiments)**
- 5. The suppressive action on the immune system**
- 6. Suppressive action on the enzymes, which provide tissue respiration.
(glucose - 6 phosphate - dehydrogenase and fructose - 6 phosphate - dehydrogenase)**
- 7. Presents the precursors in synthesis of nitrosamines (carcinogens).**

B. Food additives.

***A food additive* is any substance not commonly regarded or used as food, which is added to, or used in or on, food at any stage to affect its keeping quality, texture, consistency, taste, color, alkalinity or acidity, or to serve any other technological function in relation to food, and includes processing aids in so far as they are added to or used in or on food**

Glossary of Food Additive Terminology

- **Anticaking and Free-Flow Agents**

Substances added to finely powdered or crystalline food products to prevent caking, lumping, or agglomeration.

- **Antimicrobial Agents**

Substances used to preserve food by preventing growth of microorganisms and subsequent spoilage, including fungistats and mold and rope inhibitors.

- **Antioxidants**

Substances used to preserve food by retarding deterioration, rancidity, or discoloration due to oxidation.

- **Colors and Coloring Adjuncts**

Substances used to impart, preserve, or enhance the color or shading of a food, including color stabilizers, color fixatives, color-retention agents, etc.

Glossary of Food Additive Terminology

- **Curing and Pickling Agents**

Substances imparting a unique flavor and/or color to a food, usually producing an increase in shelf life stability.

- **Dough Strengtheners**

Substances used to modify starch and gluten, thereby producing a more stable dough.

- **Drying Agents**

Substances with moisture-absorbing ability, used to maintain an environment of low moisture.

- **Emulsifiers and Emulsifier Salts**

Substances which modify surface tension in the component phase of an emulsion to establish a uniform dispersion or emulsion.

Glossary of Food Additive Terminology

- **Enzymes**

Enzymes used to improve food processing and the quality of the finished food.

- **Firming Agents**

Substances added to precipitate residual pectin, thus strengthening the supporting tissue and preventing its collapse during processing.

- **Flavor Enhancers**

Substances added to supplement, enhance, or modify the original taste and/or aroma of a food, without imparting a characteristic taste or aroma of its own.

- **Flavoring Agents and Adjuvants**

Substances added to impart or help impart a taste or aroma in food.

Glossary of Food Additive Terminology

- **Flour Treating Agents**

Substances added to milled flour, at the mill, to improve its color and/or baking qualities, including bleaching and maturing agents.

- **Formulation Aids**

Substances used to promote or produce a desired physical state or texture in food, including carriers, binders, fillers, plasticizers, film-formers, and tableting aids, etc.

- **Humectants**

Hygroscopic substances incorporated in food to promote retention of moisture, including moisture-retention agents and antidusting agents.

- **Leavening Agents**

Substances used to produce or stimulate production of carbon dioxide in baked goods to impart a light texture, including yeast, yeast foods, and calcium salts.

Glossary of Food Additive Terminology

- **Lubricants and Release Agents**

Substances added to food contact surfaces to prevent ingredients and finished products from sticking to them.

- **Non-Nutritive Sweeteners**

Substances having less than 2 percent of the caloric value of sucrose per equivalent unit of sweetening capacity.

- **Nutritive Sweeteners**

Substances having greater than 2 percent of the caloric value of sucrose per equivalent unit of sweetening capacity.

- **Oxidizing and Reducing Agents**

Substances which chemically oxidize or reduce another food ingredient thereby producing a more stable product.

Glossary of Food Additive Terminology

- **pH Control Agents**

Substances added to change or maintain active acidity or basicity, including buffers, acids, alkalies, and neutralizing agents.

- **Processing Aids**

Substances used as manufacturing aids to enhance the appeal or utility of a food or food component, including clarifying agents, clouding agents, catalysts, flocculants, filter aids, and crystallization inhibitors, etc.

- **Propellants, Aerating agents, and Gases**

Gases used to supply force to expel a product or used to reduce the amount of oxygen in contact with the food in packaging.

- **Sequestrants**

Substances which combine with polyvalent metal ions to form a soluble metal complex, to improve the quality and stability of products.

Glossary of Food Additive Terminology

- **Solvents and Vehicles**
Substances used to extract or dissolve another substance.
- **Stabilizers and Thickeners**
Substances used to produce viscous solutions or dispersions, to impart body, improve consistency, or stabilize emulsions, including suspending and bodying agents, setting agents, jellying agents, and bulking agents, etc.
- **Surface-Active Agents**
Substances used to modify surface properties of liquid food components for a variety of effects, other than emulsifiers, but including solubilizing agents, dispersants, detergents, wetting agents, rehydration enhancers, whipping agents, foaming agents, and defoaming agents, etc.
- **Surface-Finishing Agents**
Substances used to increase palatability, preserve gloss, and inhibit discoloration of foods, including glazes, polishes, waxes, and protective coatings.
- **Synergists**
Substances used to act or react with another food ingredient to produce a total effect different or greater than the sum of the effects produced by the individual ingredients.
- **Texturizers**
Substances which affect the appearance or feel of the food.

V. Prophylaxis of food poisoning.

- 1. Perishable foodstuffs should be stored in the refrigerator!**
- 2. Carefully defrost the frozen meat and bird before preparation!**
- 3. Delete all liquid formed during defrosting of meat and bird, and carefully wash refrigerator regiments, working surfaces and utensils on which such liquid could get!**
- 4. Carefully cook food!**
- 5. Hold the cooked food hot - at temperature not less than 60°C!**
- 6. Cool and freeze the cooked food in superficial ware!**

Prophylaxis of food poisoning(continuation)

7. Cooked food warm up to temperature not less than 70°C.

8. Store the prepared foodstuff separately from the raw foods.

9. At preparation of the mixed dishes which will submit in a cold kind, for example, potato or salads, always cool the prepared components before to add in them others.

10. All actions on preparation of perishable food should be carried out quickly.

11. The cooked food shouldn't be touched with hands.

Prophylaxis of food poisoning(continuation)
Kitchen premises and utensils

- 1. Keep clean kitchen premises and adjoining rooms to them.**
- 2. Contain kitchen in a tidy look and don't block up it.**
- 3. Clean often your kitchen.**
- 4. Clothes and towel which contacted with products, ware and utensils, it is necessary to change daily.**
- 5. Protect kitchen and warehouse from insects and parasites.**
- 6. Store the dangerous/poisonous substances for example washing both, disinfectants, out of kitchen premises in the capacities closed and supplied with labels.**
- 7. Don't overload refrigerating machinery.**
- 8. Don't break instructions concerning the set operating time/operating mode/temperature of the dishes washing machine.**