	Федеральное государственное бюджетное образовательное учреждение высшего образования «Волгоградский государственный медицинский университет» Министерства здравоохранения Российской Федерации Образовательная программа специальности 31.05.01 Лечебное дело (специалитет)	УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ДИСЦИПЛИНЫ «ГИГИЕНА»

ТЕМА:
« FOOD QUALITY ASSESSMENT (part 1,2)»

Methodical recommendations to the lesson
for students in the specialty 31.05.01 "General Medicine"

г. Волгоград, 2020 г.

The motivational description of the theme

In ordinary circumstances, food items present no threat to human health. To control their quality, their sanitary inspection is performed: estimating their organoleptic properties, checking the chemical composition against hygienic indices and requirements, the nature of bacterial or parasitic contamination, the role of a food item in potential infection transmission and triggering a foodborne disease, investigating the storing conditions that caused a change in the food properties. When an inspection of a food item is complete, a conclusion is made stating its quality, conditions of sale depending on its revealed properties, and the possibility of processing it or a need to destroy it altogether.

The objective: mastering the technique of estimating the quality of food items (example: milk, meat, bread).

Students' independent classroom activities

2. Case problems.

2. Laboratory work investigating and estimating the quality of milk and bread samples.

3. Student's presentation and their discussion.

Self-study task

1. Degrees of the quality of food items.
2. Diseases transmitted to humans via milk and meat.
3. Hygienic requirements imposed on the quality of milk.
4. Hygienic requirements imposed on the quality of meat.
5. Hygienic requirements imposed on the quality of bread.

Plan of students' independent work

1. Case problem. The solution of case problems should be reported in writing.

2. Sanitary estimation of the quality of milk.

2.1. Determining organoleptic properties of milk (appearance, consistency, taste, smell, colour).

2.2 Determining physical and chemical indicators of the quality of milk:

- specific weight of milk,
- milk acidity.

2.3. Testing milk for adulteration:

- revealing the presence of starch
- revealing the presence of soda

2.4. Conclusion about the quality of milk and the possibility of its use

3. Sanitary estimation of the quality of bread.

3.1. Determining organoleptic properties of bread:

surface, colour, shape of bread, bread crumb, smell;

3.2. Determining physical and chemical indicators of bread:

-porosity of a bread sample;
- acidity of a bread sample)
3.3. Conclusions about the quality of bread and the possibility of its use

Reference information

Term descriptions

QUALITY OF FOOD ITEMS is a complex of characteristics describing the food nutritional value and safety. If the food item meets the hygienic requirements, it can contribute to satisfying the physiological need in nutritients and energy without any detriment to health.

BABY FOOD is referred to as special foodstuffs which meet the physiological requirements of a baby´s organism.

DIETARY PRODUCTS are special foodstuffs used in preventive or clinical nutrition.

CERTIFICATE OF QUALITY is a document in which the manufacturer confirms the origin of the food and ensures that it corresponds to the requirements of standardizing and technical documentation.

SAFETY OF FOODSTUFFS means absence of factors which may endanger the life and/or health of people of the present and future generations. The foods are qualified as safe if they meet the requirements imposed on food production, sanitary rules, and hygienic norms.

The composition and properties of foodstuffs, especially their consumer properties and indications for their safe use, are determined on the basis of their organoleptic, physical, chemical, microbiological, parasitic and radiological properties as well as on their nutritional value.

Organoleptic properties of raw materials and cooked foods are determined on the basis of their taste, colour, smell, consistency and appearance that are specific to each product. Organoleptic properties should satisfy traditional tastes and eating habits of the population and should not cause any complaints on the part of consumers.

The content of basic chemical hazardous substances, such arsenic, cadmium, mercury, copper and zinc, in raw materials and cooked foods should be controlled. The content of mycotoxins, such as aflatoxin B1, desoxynivalenol, zearalenone, T-2 toxine, in vegetables should be also monitored. The content of aflatoxin M1 in milk and dairy products should be limited.

The content of pesticides, such as hexachlorocyclohexane, DDT (dichloro-diphenyl-trichloroethane) and its metabolites, in all kinds of raw materials and cooked food, should be supervised as well. The content of veterinary agents and antibiotics used for feeding cattle and poultry, for treating and preventing their diseases must be limited in meat products. No presence of pathogenic or parasitic microorganisms which cause infectious diseases of animals and people is allowed. Nutritional value of products, including the content of basic food substances, such as proteins, fats, carbohydrates, macro- and microelements, and the energy value of

a product are the basic criteria used in estimation of the quality of raw materials and cooked food.

Degrees of food quality

1. *Foods of high quality* meet all hygienic requirements; their consumption poses no threat or doubt; there are no limitations to selling them for consumption purposes

2. *Foods of poor quality* can pose a threat to human health upon consumption; they may have a marked unpleasant taste or other organoleptic qualities; they do not meet the hygienic requirements; no way of processing them can improve their quality; they are not allowed to be sold for consumption purposes.

3. *Conditionally suitable food foods* in their natural condition pose a threat to human health; upon certain processing the defect may be eliminated and the food allowed to be consumed.

4. *Foods with decreased nutritional value* due to violation of technological processing and terms of storage do not meet all the hygienic requirements; however, they do not pose a threat to human health; their organoleptic and other properties are satisfactory.

Table 1

Organoleptic indicators of baked goods of wheat flour

Index	Description
Appearance: form, surface, colour - Baked in the hearth - Shaped -Structure of the bread crumb -Degree of baking -Degree of kneading - Porosity Taste Smell	Rounded, oval-oblong. Corresponds to the form in which the bread is baked without any changes. From light yellow to brown. Smooth, without any large cracks or tears. Bread baked in the hearth may have some cuts or cracks; shaped bread may have a seam. Well-baked, not damp to the touch. Elastic. When pressed, the bread reverts back to its initial shape. Without lumps or traces of poor kneading. Advanced, without holes or lumps. Detachment of the crust from the bread crumb is not allowed. Typical of the given product, without any particular taste. Typical of the given product, without any additional smell.

Table 2

Physical and chemical indicators baked goods of bread wheat flour

Name of index	Dampness of bread crumb, % no more than	Acidity of bread crumb, g no more than	Porosity of bread crumb, % no less than
Baked goods of			

wheat flour: Wholemeal flour Second grade First grade Granular flour Best quality Extra quality	 19.0 – 52.0 19.0 – 48.0 19.0 – 48.0 19.0 – 48.0 19.0 – 48.0 19.0 – 48.0	 8.0 5.0 4.0 3,5 3.5 3.5	 54.0 63.0 65.0 68,0 68.0 70.0

Table 3

Organoleptic indicators of cow milk

Index	Description
Appearance and consistency	Homogeneous liquid without any sediment. For baked milk and for pasteurized milk 4.6 % of fat content without a sediment of cream is normal.
Taste and smell	Pure, without any additional taste or smell, atypical of raw milk.
Colour	White with a slightly yellowish shade, for baked milk – with a cream shade, for low-fat milk – with a slightly bluish shade.

Table 4

Physical and chemical indicators of milk

Index	Value of the index for a product with the fat percentage, % no less				
	fat less than 0.5	0.5; 1.0	1.2; 1.5; 2.0; 2.5	2.7; 2.8; 3.0; 3.2; 3.5; 4.0; 4.5	4.7; 5.0; 5.5; 6.0; 6.5; 7.0; 7.2; 7.5; 8.0; 8.5; 9.0; 9.5
Density, g/cm³. no less than	1030	1029	1028	1027	1024
Protein, % no less than	3.0				
Acidity, T no more than	21				20

Sanitary examination of the quality of meat

Sanitary examination is carried out considering the indicators of organoleptic and chemical properties of meat as well as the results of bacterioscopic and helminthic investigations.

Table 5

Indicators of meat freshness

Indicator	Fresh	Of doubtful freshness	Tainted
1	*2*	*3*	*4*
Surface of the carcass or semi-carcass	Clean, dry, pale pink or pale red drying crust	Some amount of mucus on the surface sticks to the fingers	Gray or greenish color, often covered with mold or mucus
Muscles on the cut	Surface of a fresh cut is slightly moist but not sticky	Surface of muscles is sticky to the touch	Surface of muscles is sticky to the touch, of gray or greenish color
Meat juice	In small amount; red, transparent	Turbid	Turbid with an unpleasant smell
Consistency	Muscular tissue is dense, elastic. A pit formed by pressing levels out quickly	Muscular tissue is flabby, loose. A pit formed by pressing levels out in over 1 minute	Muscular tissue is flabby, loose. A pit formed by pressing does not level out
Odor	Pleasant, typical of each category of meat	Putrefactive odor on the surface; no odor by the bone	Clearly putrefactive marked odor, stale or sour in the depth of muscle
Bone marrow	It fills the whole space of the tubular bone; it is resilient, of yellowish color, shiny, does not detach from the bone edge	Of gray color. slightly detached from the bone, soft. without shine	Of dirty gray color, does not fill the tubular bone space, spreads easily
Tendons	Resilient, dense, smooth, shiny	Of grayish color, softened	Of dirty gray color, moist, covered with mucus
Cooked broth	Clear, fragrant, of pleasant taste	Turbid, without fragrance, with stale odor	Dirty with flakes and putrefactive odor
Sanitary	*Can be used without*	*Semicondemned*	*Should be rejected*

conclusion	*limitations*	*meat must be subjected to laboratory investigations. Depending on the findings a decision is made whether it is fit for use*	*on the basis of organoleptic properties; no lab tests necessary*

Helminthic investigation of meat

Meat can be invaded by larvae of some helminthes, such as pork tapeworm or beef tapeworm. The meat invaded by larvae of these helminths is called measled meat. The larvae can be seen with a naked eye on the cut of muscular tissues. They look like lentil- or pea-sized whitish bubbles. The larvae produce specific crunching upon squashing.

Meat is considered conditionally suitable for human consumption if on the general area of the cuts of a size about 40 cm² no more than 3 larvae are found. Such meat is allowed to be used as raw material for manufacturing sausages or canned food after disinfection.

There are some ways of disinfecting such meat:

1. Boiling the pieces of meat (they should be no more than 2 kg and no more than 8 cm in width) for 3 hours.
2. Freezing the meat at -12 Cº for 20 days.
3. Salting the pieces of meat (they should be no more than 2.5 kg) for 20 days.

If there are more than 3 larvae on the area of 40 cm², the meat is subjected to technical recycling.

Meat can be invaded by larvae of trichina. Meat is considered unsuitable for

human consumption if at least one trichina is found in 24 cuts.

Appendix

SANITARY & HYGIENIC ESTIMATION OF MILK

Assignment 1

1. Determining organoleptic properties of milk

1.1. Appearance. The appearance of milk is estimated in a transparent vessel. Milk may be homogenous, sedimented, polluted. It contains some admixtures.

1.2. Colour. The colour of milk is determined in a cylinder made of colourless glass. It usually contains 50-60 ml of milk.

1.3. Consistency. The consistency of milk is determined considering the traces remaining on the walls of a vessel after shaking. If the consistency of milk is normal, white traces on the walls of a vessel usually remain.

1.4. Smell. One should pour 100 ml of milk into a conical vessel, close it with a glass and shake the milk. Only then the smell of milk can be determined. Fresh milk has a specific smell.

1.5. Taste. One should drink some milk (5-10 ml) keeping it for some time in the mouth. The taste of milk of high quality is slightly sweetish.

2. Determining physical & chemical properties of milk.

2.1. Determining the specific weight of milk.

Specific weight of milk is determined with the help of a lactodensimeter which has two scales: the lower for determining specific weight of milk and the upper to measure the temperature. The specific weight of milk can be conventional (Keven´s degree). Each Keven´s degree corresponds to one thousandths of a gram. For example, if the specific weight of milk is 1. 027, the density of milk should be 27 Keven´s degrees.

One should pour 150 ml of milk into a glass. Then the lactodensimeter should be put into the milk to the mark 1.030 so that it does not touch the walls of the glass. The specific weight of milk is determined considering the indicators of the upper level of milk. One should do it within 5 minutes after pouring the milk into the glass. Considering the indicators on the upper scale, one can determine the temperature of milk. If the temperature of milk is over 20 Cº, one should correlate it with the readings of the lactodensimeter and add the difference which is 0.2 Keven´s degree. If the temperature of milk is below 20 Cº, the difference of 0.2 Keven´s degree is subtracted.

2.2. Determining milk acidity.

One should pour 10 ml of milk, 20 ml of purified water, 3-4 drops of 1%-solution of phenolphthalein into a conical vessel. It should be titrated by 1%-solution of alkali NAOH till the solution is very pale pink.

The amount of titrated alkali multiplied by 10 is considered to be milk acidity shown in Terner´s degree. It corresponds to the amount of 0.1% alkali used for neutralizing the acids found in 100 g of milk.

3. Testing milk for adulteration

3.1. Revealing the presence of soda.

One can add soda to the milk in order to conceal increased milk acidity. Soda neutralizes lactic acid and thus there is no protection against the development of microorganisms. Besides, soda stimulates the loss of vitamin C. Such milk is not suitable for human consumption.

One should pour 5 ml of milk and 4-5 drops of 0.2%-alcoholic solution of rosolic acid into a glass. The milk usually becomes crimson-red in the presence of soda. If there is no soda in the milk, it usually turns a yellow-brownish colour.

3.2. Revealing the presence of starch.

One can add starch or flour to milk in order to give it a much denser consistency after adding some water to it.

One should pour 10-15 ml of milk into a test-tube and boil it. After cooling it, one should add 1 ml of Lugol´s iodine into the milk. If the milk becomes blue, it contains some starch.

Assignment 2. Sanitary & hygienic estimation of bread

1. Determining organoleptic properties of bread

One should examine the surface of bread (the outer and lateral crust) and evaluate its colour and shape.

One should press the bread crumb and evaluate its elasticity and porosity.

One should estimate the taste and smell of bread.

2. Determining physical and chemical properties of bread

2.1. Determining the porosity of bread.

Porosity of bread is the number of pores per some proportion of bread. It is calculated in percent.

The density of non-porous proportion of bread is a relative constant.

Type of bread	Density g/cm³
Rye bread & rye-wheat bread	1.21
Rye bread from the flour made of scald milk	1.27
Wheat bread of the second grade	1.26
Wheat bread of the first grade	1.1

One should cut off a slice of bread 27 cm³ in size with a cylindrical knife. The weight of the slice of bread should be measured. The porosity of bread can be calculated using the following equation:

$$X = \frac{(в - а/б) \cdot 100}{В}$$

where: X – porosity of bread, %;

В – volume of the bread crumb with pores (27 cm³);

А – weight of the bread crumb;

Б – density of non-porous proportion of the bread.

The relation а/б is the volume of non-porous part of the bread crumb.

2.2. Determining the acidity of bread.

The acidity of bread is conditioned by the presence of acetic and lactic acids in it. It is calculated in degrees which corresponds to the amount of milliliters of 1%-solution of NAOH used for neutralizing the acetic and lactic acids found in 100 g of bread.

25 g of bread taken from different parts of the loaf should be cut off and put into a 250-300 ml vessel. One should pour 50 ml of purified water into the vessel and stir it with the help of a glass stick. It is necessary to make the mass homogenous. Then one should add some more water (150 ml) to the vessel. close it

with a lid and shake it for 2-3 minutes. The bread should be left for 10 minutes to achieve sedimentation. The upper layer of the fluid should pass through a fine filter. 50 ml of the filtrate should be put into a conical vessel. One should add 2-3 drops of 1%-solution of phenolphthalein into it. The mixture is titrated by 0.1%-solution of NAOH until it becomes pink. The acidity of bread is calculated in degrees.

Example: One took 7.5 ml of 0.1%-solution of NAOH for titrating 50 ml of filtrate. Hence, one should take $7.5 \cdot 4 = 30$ ml of 0.1%-solution of NAOH for titrating 200 ml of filtrate, or 25 g of bread.

One should take $30 \cdot 4 = 120$ ml of 0.1%-solution of NAOH, or 12 ml of 1%-solution of NAOH for titrating 100 g of bread.

Thus, the acidity of the bread is 12 degrees.