

**ФГБОУ ВО НОВОСИБИРСКИЙ ГАУ
БИОЛОГО-ТЕХНИЧЕСКИЙ ФАКУЛЬТЕТ**

Principles forming quality of meat production

**Методические указания по выполнению самостоятельной и контрольных
работ**

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Методические указания предназначены для бакалавров очной и заочной форм обучения Биолого-технологического факультета, обучающихся по направлению подготовки 19.03.04. Технология продукции и организация общественного питания, 38.03.07. Товароведение, 27.03.01 Стандартизация и метрология, 19.03.03. Продукты питания животного происхождения, 35.03.07. Технология производства и переработки сельскохозяйственной продукции.

Изложены основные разделы курса «Principles forming quality of meat production» с указанием видов и форм контроля тем, выносимых для самостоятельной работы бакалавров очной и заочной форм обучения и выполнения контрольных. Приведены словарь-терминов, библиографический список, вопросы для контроля.

Методические указания утверждены и рекомендованы к изданию на заседании учебно-методического совета БТФ (протокол №2 от 1 марта 2017г.)

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1. ВВЕДЕНИЕ

1.1. Цели и задачи учебной дисциплины

Дисциплина Principles forming quality of meat production предназначена для формирования базовых знаний по химическому составу, пищевой и биологической ценности мяса и мясных продуктов, изменению их состава и свойств под влиянием различных факторов, биохимических и физико-химических процессов, протекающим при обработке мясного сырья, выработке различных мясных продуктов и изменению мясных продуктов при хранении.

В соответствии с назначением основной целью дисциплины является формирование современных представлений, знаний и умений о превращениях веществ и энергии в живых организмах, химическом составе продукции животного происхождения, биохимических процессах, происходящих в ней при хранении и переработке.

Исходя из цели, в процессе изучения дисциплины решаются следующие задачи:

- изучить химический состав мяса и биохимические процессы, происходящие в животноводческой продукции при хранении и переработке;
- оценка качества и технологических свойств мяса по биохимическим показателям;
- идентифицировать биохимические процессы, протекающие при производстве, переработке и хранении мяса;
- знакомство с современными методами и достижениями биохимической науки.

2. СОДЕРЖАНИЕ ОТДЕЛЬНЫХ РАЗДЕЛОВ И ТЕМ ДЛЯ САМОСТОЯТЕЛЬНОЙ РАБОТЫ (СОГЛАСНО РАБОЧЕЙ ПРОГРАММЕ)

2. 1.Introduction

2.1.1. *General characteristics of meat*

The biochemical composition of meat: water, proteins, lipids, carbohydrates, nitrogenous extractives, nitrogen-free extractives, vitamins, minerals, enzymes.
The basic properties of meat

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.
2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»
- 13.Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
- 14.Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
15. <http://www.meatbranch.com/literature/view/665.html> мясные технологии;
16. <http://www.meatbranch.com/literature/view/50.html> мясные технологии.

Вопросы для самоконтроля

- 1.What are the physiological functions of muscle tissue?
- 2.List the chemical components included in the composition of meat.
- 3.What is the role of free and bound water in the composition of meat?
- 4.How to determine the biological value of proteins of meat (the concept of soon)?
- 5.Carbohydrates muscle tissue and their biological role.
- 6.What are the biological functions of lipids of meat?
- 7.What's called peroxidation destruction of lipids of meat?
- 8.What types of antioxidants used in the manufacture of meat and meat products, are currently being used?
- 9.What is the function of extractives of meat in the formation of its organoleptic properties?
- 10.Vitamins and enzymes meat and their importance to the human body.
- 11.Functions of macro - and trace elements of meat.
- 12.The main properties of the meat.

2.1.2. Biochemistry of muscle tissue

Protein myofibrils (myosin, actin, tropomyosin, troponin, actomyosin), sarcoplasmic proteins (Myogit, globulin "x" mioalbumin, myoglobin, etc.), proteins sarcolemma (reticulin collagen, elastin, etc.). Their basic properties and functions.

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2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.

9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
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12. Журнал «Новое мясное дело»
13. Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
14. Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
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Вопросы для самоконтроля

1. Proteins of myofibrils and their main functions.
2. Proteins sarcolemma.
3. What is the role of myoglobin in Svetovrachane raw materials and meat products?
4. Proteins of the sarcolemma
5. Difference smooth muscles skeletal.
6. The basic properties of white and red muscle fibers.

2.1.3. Biochemical processes in meat after slaughter

Dynamics of the autolytic processes in meat post-slaughter and its variants in different animal species. The process of rigor mortis, rigor mortis permit, maturity and depth of autolysis. Development defects of meat due to pre-slaughter stress. Prevention of pre-slaughter stresses. Questions of regulation meat production.

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2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.

6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
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11. Журнал «Мясная индустрия»
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- 13.Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
- 14.Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
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Вопросы для самоконтроля

1. Basic biochemical changes in meat during its rigor.
2. What determines water-holding capacity of meat and how it changes in the process of autolysis?
3. Maturation of the meat and its regulation.
4. What is the function of lysosomal enzymes in the animal's life and in the process of autolysis?
5. Deep autolysis, its types.
6. How it changes the dynamics of pH during the ripening process of meat?
7. Classification of meat depending on pH (NOR,PSE,DFD).
8. Differences between aged meat from pair.
9. Evaluation stage avtomaticheskij transformations of muscular tissue by chemical autolysis.
- 10.Assessment of depth and character avtomaticheskij transformations meat by the methods of histological analysis.
- 11.Study of the effect of stage of maturity on chemical composition and functional and technological properties of meat.

2.1.4.Changes in the meat under low temperatures

Cooling and storage of chilled meat and meat products. Purpose and types of cold meat processing. Factors affecting on the stability of microbial spoilage of meat during cooling. Autolytic changes during cooling and storage. The mechanism of "cold-contracting." Physico-chemical changes occurring in meat

during storage in a refrigerated state. Factors help to storage for a long time. Biochemical changes in the components of the meat under microorganisms. Conversion of protein and nitrogenous extractives. Changes in pigments. Conversion of lipids. Conversion of carbohydrates. The biochemical basis of microflora in meat products. Biochemical changes in meat processing refrigeration. The main changes during freezing.

Autolytic conversion components. Features rigidity of muscles. Change the properties of muscle proteins. Features of changes in the properties of meat during cold treatment. Features maturation defrosted meat. Freezing and storage of frozen meat and meat products. Theoretical foundations of freezing. Production freeze, their rationale, the effect on the properties of meat. Effect of freezing on the protoplasm of cells. Causes of organisms death by freezing. Characteristics of temperature curves at various rates of freezing. Effect of freezing. Effect of freezing on the solvate shell of protein particles. Mechanism for the redistribution of moisture through the thickness of frozen product. The influence of various factors. Effect of freezing on colloidal systems, changes in the properties of proteins in egg yolk. Effect of freezing (fast, slow), autolytic processes on. Characteristics of autolytic processes occurring during storage of frozen meat. The technological process of defrosting meat. Effect of thawing on the properties and meat quality. Optimal conditions defrosting meat.

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.
2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.

10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»
13. Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
14. Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
15. <http://www.meatbranch.com/literature/view/665.html> мясные технологии;
16. <http://www.meatbranch.com/literature/view/50.html> мясные технологии.

Вопросы для самоконтроля

1. Classification of meat depending on the temperature of cooling.
2. What type of cooling process used in technology of meat products?
3. What are the features of physical and chemical processes during freezing of raw material?
4. What is autolysis and maturation of thawed meat?
5. What is the difference frozen meat from frozen?
6. Explain the negative effect of rapid cooling of the meat.
7. What processes occur in frozen meat?
8. Changes in meat during freezing and storage.
9. Freeze-drying of meat and its importance.
10. The essence of the Ambassador, its classification.

2.1.5. Chemical changes in meat by salting

Preservative effect of salt, the chemistry of nitrates and nitrites in the process of salting, the role of glucose, glutamine, and ascorbic acid in the salting of meat. Change the color of meat and meat products and processes governing it. Salting of raw materials. Types of salting. Filtration diffusion process of accumulation and distribution salting substances. The filtering process of allocating salting substances. Intensification of pickling by mechanical action. Loss of soluble substances in salting meat. Changes in humidity and moisture-binding capacity during salting. Changing meat, proteins, lipids and other substances. The formation of aroma and flavor. The change of the microstructure. Stabilization of meat color. The role of microbial and enzymatic agents in salting, including the introduction of bacterial starter cultures. The formation of nitrosamines. Features of salting salty meat. Features cured sausage meat.

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.

2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
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- 13.Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
- 14.Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
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- 16.<http://www.meatbranch.com/literature/view/50.html> мясные технологии.

Вопросы для самоконтроля

1. The protein changes of meat during salting?
2. The advantages and disadvantages of different types of meat curing.
3. Changes of extractives in the process of Ambassador
4. Give the characteristic of fast salting and slow.
5. The value of organophosphorus compounds with the Ambassador.
6. The formation of a specific color during salting.
7. Features of autolysis at the Ambassador.
8. Substances-stabilizing coloration in fast and slow curing.
9. The influence of pH on the processes of hydration in the salt meat. Explain your answer.

2.1.6. Chemistry smoked meat

Changes in physico-chemical and biochemical processes in the meat in cold, hot and mixed smoking. Treatment meat smoke. The essence of the process. The composition of smoke. The most important properties of smoking materials and their antiseptic and antioxidant effects, effects on color, aroma and taste. Interaction of smoking materials with the product. Smoking drugs and their evaluation. Smoked. The purpose, nature, mode of smoking. Physico-chemical, structural, mechanical and biochemical changes in the process of smoking. Features of various smoking meat. Sanitary and hygienic problems of improving smoking production. Intensification of smoking process. The essence of smokeless smoking. Characteristics of smoking products and flavors. Comparative analysis of smoking methods.

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.
2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»
13. Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
14. Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.

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16. <http://www.meatbranch.com/literature/view/50.html> мясные технологии.

Вопросы для самоконтроля

1. The difference of biochemical parameters of smoked meat, depending on the ways temperature?
2. Classification of methods of Smoking meat.
3. The chemical composition of smoke and the significance of phenols.
4. What type of Smoking relates to environmentally and health-friendly technologies?
5. Positive effects of Smoking.
6. Negative effects of Smoking.
7. The mechanism of formation of color smoked meat products.
8. Physico-chemical and biochemical changes in meat during Smoking.
9. Biological assessment of smoked products.

2.1.7. Changes in meat during thermal processing

The process of boiling, frying, blanching, sterilization, pasteurization, baking, etc. Short-term smoking at high temperatures (frying). The purpose, nature, mode of roasting. Physico-chemical changes during roasting. The heat treatment. The goal, the options of heat treatment. Denaturation and aggregation of muscle proteins during heating. Welding and hydrothermal decomposition of collagen. The influence of various factors on the changes of proteins. Change the extractives and vitamins. Pasteurizing the heating effect. Cooking sausages. Changes that occur during cooking. Justification regime cooking. Defects in cooking and their causes. Boiling of piece goods. Changes that occur during cooking. Mode of cooking certain types of products. Cooking in forms. Baking. The essence of the process. The **smoked meat** changes occurring in the baking. Smoking - baking. Cooled. The target. The manner, mode of cooling. Drying meat. The purpose of drying. Formation of the structure of sausages. The role of the acidity index of meat. The role of microflora in the maturation process - drying of sausages. Formation of color sausages. Minced meat-drying facility. Internal and external moisture transfer. Transfer vlagorastvorimyyh substances. The physico-chemical processes of change in the structural components of meat.

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.
2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.

3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»
- 13.Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
- 14.Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
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Вопросы для самоконтроля

1. List the changes that occur in muscle proteins during cooking.
2. The mechanism of formation of traditional painting in the cooking process.
3. Features of the disintegration of the components of muscle tissue under influence of high temperatures.
4. Classification of methods of thermal processing of meat raw materials.
5. Which indicators of meat affects thermodenaturation proteins.
6. The effect of cooking on the status and properties of collagen.
7. What kind of heat treatment of meat is from a biochemical point of view more functional for human health? Justify.
8. The essence of the reaction of Maillard.

2.1.8. Biochemistry of blood in the meat of various animals

Blood chemical composition. Proteins, carbohydrates, lipids and other organic substances of blood. Mineral structure of blood. Features of chemical composition and metabolism of blood cells element substances. Practical use of blood proteins. Age and species features of animal blood chemical composition.

Requirements for raw materials. Collection of blood. Stabilization of blood. Defibrinирование blood. Separation of blood. Coagulation precipitation of blood proteins. Preservation of blood and blood components. Discoloration of the blood. Drying blood. Concentration of blood plasma. Biochemical properties and functions of blood. Biochemical functions of blood. Morphological characteristics of blood. The chemical composition and physico-chemical properties of blood. The blood plasma. Plasma proteins. Biochemical and physico-chemical properties of plasma proteins. The enzymes of the plasma. Enzymatic elements. Biochemical transformation of with drawn blood. Clotting. The process of coagulation. The main properties of the components of coagulation. Stabilization of the withdrawn blood. Defibrinative. Hemolysis. Autolytic conversion. Biochemical changes under the influence of microbes. The use of blood. Nutritional value of blood. Biological substances from the blood.

Доступные источники литературы

1. Рогожин, В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. – СПб.: ГИОРД, 2012. – С.302-370.
2. Данилова Н.С. Физико-химические и биохимические основы производства мяса и мясных продуктов. - М.: КолосС, 2008. - С.7-91.
3. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288с.
4. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – С.9-188.
5. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
6. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
7. Рогов И.А., Жаринов А.И., Воякин М.П. Химия пищи. Принципы формирования качества мясопродуктов. - СПб.: РАПП, 2008. - С.317-331.
8. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
9. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»
- 13.Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – С.5-14.
- 14.Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.

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Вопросы для самоконтроля

1. Main biochemical functions of blood.
2. Fractional composition of blood.
3. Physico-chemical properties of blood.
4. The usefulness of blood proteins (give a description).
5. The main proteins of blood plasma.
6. Cells included in the blood and what is their value?
7. Methods for processing blood.
8. The difference from stabilized blood defibrinated.
9. Explain the process of defibrinate blood.
10. Hemolysis of blood and the factors of its cause.
11. The process of blood clotting.
12. For what purpose carry out the coagulation of blood?
13. What is discoloration of blood (what are the main methods of this process).
14. What technical products are produced from the blood of slaughtered animals?
15. What is the essence of separation of blood?
16. Name technology of using blood.

3. СОДЕРЖАНИЕ И ОРГАНИЗАЦИЯ САМОСТОЯТЕЛЬНОЙ РАБОТЫ

Целью самостоятельной (внеаудиторной) работы бакалавров является обучение навыкам работы с учебной и научной литературой и практическими материалами, необходимыми для изучения курса Principles forming quality of meat production и развития у них способностей к самостоятельному анализу полученной информации.

Самостоятельная работа студента направлена на более глубокое освоение фактического лекционного материала или при выполнении лабораторных работ. Пропущенные лекции отрабатываются в форме представления их конспектов и составления вопросов по основным положениям материала.

Задания по самостоятельной работе могут быть следующими:

- проработка учебного материала при подготовке к занятиям, текущему, промежуточному контролю знаний по бально-рейтинговой системе;
- поиск и обзор публикаций и электронных источников информации при выполнении индивидуального задания, подготовке к зачету;
- подготовка и выполнение курсовой работы по интересующему разделу;
- работа с тестами и контрольными вопросами при самоподготовке.

Результаты самостоятельной работы контролируются преподавателем. Учитываются при аттестации студента (зачет). При этом проводится тестированный экспресс-опрос на лабораторных занятиях, заслушивание

докладов, проверка курсовой работы. В процессе изучения дисциплины студенты выполняют следующие виды самостоятельной работы (в часах):

- подготовка к лабораторным занятиям	10
- выполнение индивидуального задания	8
- подготовка к тестированию	9
- подготовка к зачету	9

3.1. ТЕМЫ КОНТРОЛЬНЫХ РАБОТ(по желанию)

- 1.Part of connective tissue proteins in the dynamics of the physical properties of meat during storage.
- 2.Inorganic cations and anions meat and their biochemical functions.
- 3.Biogenic and synthetic antioxidants in the practice of animal husbandry.
4. Stability of fats and the shelf life of fat-containing products.
5. Food ingredients to increase the shelf life of meat products.
6. Food ingredients to increase the shelf life of dairy products.
7. Stability and shelf life of meat.

3.2. ОБЩИЕ ПОЛОЖЕНИЯ ПРИ ОФОРМЛЕНИИ КОНТРОЛЬНОЙ РАБОТЫ (по желанию)

Контрольная работа должна содержать следующие структурные элементы:

- титульный лист;
- содержание (оглавление);
- перечень сокращений, условных обозначений, символов, единиц и терминов (при необходимости);
- введение;
- обзор литературы;
- заключение;
- список использованной литературы;
- приложение (при необходимости).

Текст работы должен соответствовать следующим требованиям: отражать умение работать с литературой, выделять проблему и определять методы ее решения, последовательно излагать сущность рассматриваемых вопросов, показывать владение соответствующим понятийным и терминологическим аппаратом; иметь приемлемый уровень языковой грамотности с использованием научного изложения материала.

Студенты самостоятельно выбирают тему работы в соответствии со своими интересами. Работа выполняется в течение соответствующего семестра учебного года. Объем реферата — от 10 до 15 страниц, включая список использованной литературы не менее 10 источников.

Работа должна быть отпечатана на одной стороне листа белой бумаги формата А4 через полтора интервала. Цвет шрифта черный, а размер — не менее 12. На странице устанавливаются поля: правое 30 мм, верхнее и нижнее — 20 мм, левое — 15 мм.

Список литературы оформляется в соответствии с библиографией 2008 года (библиотека НГАУ).

По согласованию с преподавателем, работа может быть представлена в электронной форме или в виде презентации.

Защита контрольной работы предполагает доклад студента на предпоследнем занятии изучаемой дисциплины. Время доклада не должно превышать 5 минут.

Примерное содержание доклада на публичной защите:

название работы;

актуальность, научная новизна;

основные результаты, полученные в работе, выводы и перспективы продолжения работы;

практическая значимость.

Образец оформления титульного листа

**МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА РФ
ФГБОУ ВО НОВОСИБИРСКИЙ ГАУ
КАФЕДРА ВЕТЕРИНАРНОЙ ГЕНЕТИКИ И БИОТЕХНОЛОГИИ**

Контрольная работа

Тема:

**Выполнил студент 2311 группы
Ф.И.О.**

Проверил д.б.н., профессор Ф.И.О.

Новосибирск 2016

3.3 СПИСОК ВОПРОСОВ ДЛЯ ПОДГОТОВКИ К ЗАЧЕТУ

1. Meat, its classification and nutritional value.
2. Fat meat, their classification and significance.
3. The state of water in meat and its value.
4. Biological value of meat proteins (chemical and biological methods).
5. Effect of organic and inorganic nitrogen-free extractives on taste, texture and color of meat.
6. Nitrogenous extractives of meat.
7. Features of triglyceride fatty acid composition of fat tissue of various species of farm animals.
8. Lipid metabolism in farm animals, their causes and effects on lipid composition and quality of meat and meat products.
9. Fat-soluble vitamins, the factors determining their content in meat and meat products.
10. Enzymes of meat.
11. Inorganic cations and anions, of meat, their biochemical functions.
12. The main properties of meat.
13. Characteristics and structure of muscles.
14. Varieties of muscle tissue. Biochemical differences in the composition and functions of smooth and skeletal muscle.
15. Biochemical factors regulating the function of providing and contractile proteins.
16. White and red muscle fibers, and value differences.
17. Sarcoplasmic proteins and their significance.
18. The proteins of myofibrils and their significance.
19. Sarcolemma proteins (stroma) and their significance.
20. Involvement of connective tissue proteins in the dynamics of the physical properties of meat during storage.
21. Pathological conditions associated with disruption of the structure of connective tissue proteins and factors causing them.
22. Proteoglycans: hyaluronic acid, chondroitin sulfate, keratinsulfate.
23. Functions and properties of proteoglycans and biochemical factors involved in their regulation.
24. The dependence of the meat of the content and status of proteoglycans.
25. Age-related changes in the molecular structure of connective tissue proteins. The influence of endocrine factors.
26. Slaughtering of animals. Types of slaughter (normal, halal and kashirny).
27. Stiffening carcass and its value.
28. Classification of meat according to the pH values after slaughter.
29. The enzymes of glycogenolysis.
30. Interaction of contractile proteins during rigor and relaxation of muscles after slaughter.

31. The participation of energy-rich nucleotides, calcium ions and adenosine triphosphatase in sarcoplasmic reticulum mortis and subsequent relaxation of the muscles.
32. Nucleotides are the meat and how these transformations. Participation of nitrogenous extractives in the formation of taste of meat.
33. Maturation of meat and its value.
34. Myoglobin and its derivatives.
35. Factors determining the content and the ratio of the concentration of glycogen, glucose and lactic acid in meat.
36. Deep autolysis of meat
37. The blood of farm animals and its use.
38. Composition and properties of blood.
39. Stabilization and defibrination of blood.
40. Separation of blood.
41. Coagulation precipitation of blood proteins.
42. Discoloration of the blood.
43. Classification of meat at the "cold processing".
44. Changing the properties of meat and meat products during cooling.
45. Differences between podmorazhivaniem and freezing of meat.
46. Types of salted meat, and their difference.
47. Physico-chemical changes of proteins in salting meat.
48. Physico-chemical changes of extractives in salting meat.
49. Changing the process of autolysis in the salting of meat.
50. The formation of a specific color for salting meat and its stabilization.
51. Effect of different modes of smoking on biochemical status and quality of meat.
52. The chemical composition of flue smoke and its value.
53. Smokeless smoking and its value.
54. Positive and negative effects of smoked meat.
55. The formation of color when smoked meat.
56. Physico-chemical and biochemical changes in meat during smoking.
57. Biological evaluation of smoked products.
58. Classification of methods of thermal processing of raw meat.
59. Surface heat treatment of meat and its value.
60. Heating of the entire depth of the product and its value.
61. Characteristic changes of raw meat, caused by humid heating at moderate temperatures.
62. Effect of cooking on the state and properties of collagen, muscle tissue.
63. Differences pasteurization and sterilization of meat products.
64. The contractile proteins of muscle fibers - myosin, actin, tropomyosin, troponin, - their composition, structure and function of the muscle fiber filaments, sarcolemma and Z-plates.
65. Features of the amino acid composition of proteins of muscle fibers.

3.4. ТЕСТ ПО ПРИНЦИПАМ ФОРМИРОВАНИЯ КАЧЕСТВА МЯСА ПРОИЗВОДСТВА

1. In which animals muscle fibers are thinner?

- A) sheep;
- B) cattle;
- B) pigs;
- D) horses.

2. Name proteins included in the sarcoplasm.

- A) collagen;
- B) myogen;
- B) elastin;
- D) myoglobin;
- D) globulin "x";
- E) myosin;
- G) myalbumins.

3. The ratio of which amino acids showed the presence of complete and incomplete proteins in meat?

- A) tryptophan/lysine;
- B) tryptophan/Proline;
- C) the tyrosine/methionine;
- G) the phenylalanine/cystine;
- D) the tryptophan/hydroxyproline.

4. What proteins are myofibrillar:

- A) myosin;
- B) myogen;
- B) actin;
- D) tropomyosin;
- D) globulin "x";
- E) troponin;
- G) actomyosin.

5. Which method of treatment can be used to transform meats' collagen into gluten?

- A) freezing;
- B) brine treatment;
- B) smoke treatment;
- G) thermal treatment .

6. Which muscles' protein has adenosinetriphosphatase activity?

- A) collagen;
- B) myogen;

- B) elastin;
- D) myoglobin;
- D) globulin "x";
- E) myosin;
- G) myalbins.

7. What blood product is Hematogen?

- A) food;
- B) medical;
- C) feed;
- G) technical.

8. Name the proteins of the sarcolemma.

- A) collagen;
- B) myogen;
- B) elastin;
- D) myoglobin;
- D) globulin "x";
- E) reticulin;
- G) myalbins.

9. What protein causes the natural color of muscle tissue?

- A) collagen;
- B) myogen;
- B) elastin;
- D) myoglobin;
- D) globulin "x";
- E) myosin;
- G) myalbins.

10. The faster rigor occurs:

- A) the carcasses with well-developed muscles;
- B) the carcasses with undeveloped muscles;
- C) in healthy animals after slaughter;
- G) from infected animals after slaughter.

11. The enzymatic degradation of glycogen in muscle tissue contributes to the accumulation of lactic acid and pH offset:

- A) in the acidic side at 5.8 to 5.4;
- B) to the alkaline side of 7.4 to 7.6;
- B) in the neutral of 7.0.

12. The best kind of raw material for the production of natural semi-finished products acquires:

- A) meat extract 5 period...7 days;

- B) meat with the holding period 7 to 10 days;
- B) meat with the holding period of 10-14 days.

13. The maximum reduction in the solubility of myofibrillar proteins observed:

- A) in fresh-killed meat;
- B) in meat during post-mortem;
- B) in the meat during the resolution of rigor mortis;
- G) during maturation of meat;
- D) with deep autolysis of meat.

14. The main components in forming the taste and flavor of meat are :

- A) proteins;
- B) lipids;
- B) carbohydrates;
- G) amino acids;
- E) amides.

15. What is the name of meat after cutting carcasses, characterized by the elasticity of muscles, the unmoisten surface with drying crust, and temperature is 0. to + 4°C:

- A) fresh meat;
- B) the cooled meat;
- B) chilled meat;
- D) frozen meat;
- D) frozen meat;
- E) defrosted meat.

16. Mark components which compose animals blood :

- A) proteins;
- B) red blood cells;
- C) leukocytes;
- G) a serum;
- E) plasma;
- E) platelets.

17. In which tissue NaCl ions penetrate faster by salting meat:

- A) in muscle;
- B) connective;
- B) fat;
- G) in bone.

18. What substances are used to stabilize the pink-red color in salted meat:

- A) nitrates;
- B) a nitrite;

- B) salts of ascorbic acid;
- D) glucose;
- D) sucrose.

19. The formation of aroma and taste of smoked meat due to the presence of the following substances:

- A) proteins;
- B) polycyclic aromatic hydrocarbons (PAHs);
- B) phenolic components;
- D) carbon dioxide;
- D) lipids.

20. The changes in proteins during heat treatment of meat:

- A) units are hydrolyzed;
- B) precipitate;
- B) swell;
- G) denature.

3.5. ОТВЕТЫ К ТЕКСТУ ПО PRINCIPLES FORMING QUALITY OF MEAT PRODUCTION

№ вопроса	Ответ	№ вопроса	Ответ
1	A	11	A
2	Б,Г,Д,Ж	12	Б
3	Д	13	Б
4	A,B,Г,E,Ж	14	Г,Д
5	Г	15	В
6	Е	16	Б,В,Д,Е
7	Б	17	A
8	A,B,E	18	В,Г,Д
9	Г	19	В
10	A	20	Г

4. УЧЕБНО-МЕТОДИЧЕСКОЕ И ИНФОРМАЦИОННОЕ ОБЕСПЕЧЕНИЕ

4.1. Учебно-методическое обеспечение

СПИСОК ОСНОВНОЙ ЛИТЕРАТУРЫ

1. Рогожин В.В. Биохимия молока и мяса : учеб./ В.В. Рогожин. - СПб.: ГИОРД, 2012. - 456 с.

СПИСОК ДОПОЛНИТЕЛЬНОЙ ЛИТЕРАТУРЫ

1. Данилова Н.С. Физико-химические и биологические основы производства мяса и мясных продуктов. -М.: КолосС, 2008. -280 с.
2. Антипова Л.В., Глотова И.А., Жаринов А.И. Прикладная биотехнология. – СПб.: ГИОРД, 2003. – 288 с
3. Антипова Л.В., Глотова И.А., Рогов И.А. Методы исследования мяса и мясных продуктов. – М.: Колос, 2001. – 376 с.
4. Забелина М.В., Данилова Л.В. Словарь-справочник терминов по мясу. – М.: «ЮРКНИГА», 2004. – 96 с.
5. Поздняковский В.М. Экспертиза мяса и мясопродуктов. – Новосибирск : Новосибирский университет, 2001. – 526 с.
6. Храмцов А.Г. Промышленная переработка вторичного молочного сырья/ А.Г. Храмцов. – М.: ДеЛи принт, 2003. – 100 с.
7. Шепелев А.Ф., Кожухова О.И., Туров А.С. Товароведение и экспертиза мяса и мясных товаров. – Ростов-на-Дону: «МарТ», 2001. – 192 с.
8. Шепелев А.Ф., Печенежская И.А., Кожухова О.И., Туров А.С. Товароведение и экспертиза мясных, рыбных и молочных товаров. – Ростов-на-Дону: «Феникс», 2002. – 412 с.
9. Журнал «Молочная промышленность»
10. Журнал «Все о мясе»
11. Журнал «Мясная индустрия»
12. Журнал «Новое мясное дело»

Методические указания к проведению лабораторно-практических занятий

1. Короткевич О.С., Костомахин Н.М. Биохимия мяса: учебное пособие. Новосибирск, 2002. – 62 с.
2. Дементьева Т.А. Витамины /Т.А. Дементьева, О.С. Короткевич, Е.В. Камалдинов: учебное пособие Новосибирск, 2005. - 160 с.
3. Дементьева Т.А., Короткевич О.С. Практикум по биологической химии: учеб. пособие. Новосибирск: НГАУ, 2011. - 260 с.

4.2. Информационное обеспечение

Doal – база данных иностранных журналов;

Консор, Агропоиск – современные базы данных;

Реферативная база данных Агрикола и ВИНТИ;

[ChemExper](#) - поиск соединений в различных базах данных;

[ISI's Reaction Citation Index \(RCI\)](#) – база данных по химическим реакциям;

[PubSCIENCE](#) - доступ к аннотациям статей в журналах;

[Cambridge Crystallographic Data Centre](#) – поисковая система по свойствам веществ в базе Cambridge Structural Database;

[БАЗА ДАННЫХ "ХИМИЯ"](#) Всероссийского института научной и технической информации (ВИНТИ) - доступен раздел по физико-химической биологии;

[MDL Information Systems](#) – информационно-поисковая система в области естественных наук и химии;

http://www.edka.ru/article/omoloke/como/himi4eckii_coctav_moloka.htm
химический состав молока;

<http://www.milkbranch.ru/publ/view/475.html> переработка молока;

<http://www.meatbranch.com/literature/view/665.html> мясные технологии;

<http://www.meatbranch.com/literature/view/50.html> мясные технологии;

Rambler, Yandex, Google – информационно-справочные и поисковые системы;
www.softodrom.ru - конспект лекций по биохимии.

4.3. Перечень наглядных пособий и оборудования

Для проведения лабораторных занятий имеется учебная лаборатория, оснащенная лабораторной мебелью, набором химической посуды и специальными приспособлениями, входящими в комплект биохимической лаборатории: система очистки воды, электронагреватели, технические и электронные весы, фотоэлектроколориметр, водяные бани с регулируемой температурой, термостат, сушильный шкаф, холодильная камера, рН-метр, приспособления для титрования, центрифуги, наборы термометров и денсиметров, дозирующие устройства.

Для проведения семинаров имеется специализированная учебная аудитория, мультимедийный проектор, набор демонстрационного материала в виде таблиц, рисунков, графиков, молекулярных моделей и схем, набор презентаций по теоретическому курсу, справочные материалы по разделам дисциплины.

5. СЛОВАРЬ ТЕРМИНОВ ПО PRINCIPLES FORMING QUALITY OF MEAT PRODUCTION

Absorption is assimilation or imbibition of a substance by an entire absorbing body.

Agglomerate is loose agglomeration of some part of microbes, fat globules.

Agglutinins are immune milk bodies capable to adhere bacterial cells making them immobile.

Adsorption is superficial assimilation of some substance (gas, moisture) by the overall surface of a solid or liquid phase.

Active center of an enzyme is a combination of catalytic and substrate centers of the enzyme.

Alleles are different forms of the same gene of analogous (paired) chromosomes, which are located at identical sites or loci.

Allosteric center of an enzyme is a site of a protein molecule of the enzyme which activity varies with some low-molecular substance attached to it.

Albumins are simple globular proteins promptly soluble in water and salt solutions, diluted acids and alkali; they deposit in a solution that is over 50% saturated by ammonia sulfate. They are available in milk (lactoalbumen), perform a transporting function – bind and transmit vitamins, hormones and microelements.

Aldoses are monosaccharides which conformation includes several hydroxyl and one-aldehyde groups.

Amino acids are carbonic acid derivatives with one hydrogen atom replaced with amine group ($-NH_2$) in α -carbon.

Amplification is multiplication of DNA number, i.e., gene copy multiplication by PCR method (Polymerase Chain Reaction method).

Amphiphilic molecules are molecules of substances containing both hydrophilic and hydrophobic groups of atoms.

Ampholytes are particles capable of interacting with both acids and bases.

Amphoterism is manifestation of dual properties of both acids and bases.

Anabolism is synthesis of composite molecules out of simpler ones with concomitant consumption of energy.

Antioxidants are substances retarding oxidation of unsaturated fatty acids ingressed in lipids. They are incorporated in fatty and fat-containing products.

Antitoxins are milk immune bodies capable to neutralize toxins entering or forming in organism as a result of metabolism.

Apoenzyme is a protein part of a composite enzyme.

Apotomic decay is a complex cyclic fermentative process of glucose oxidizing splitting.

Flavoring agents are substances that intensify flavor and aroma of foods. They are included into foods to improve organoleptic properties.

Aspartame is dipeptide including residues of aspartic acid and phenylalanine. It is 200-fold sweeter than sucrose and non-toxic. Aspartame is used to manufacture products, which need not be heat treated, and medicinal stuffs.

Lactobacillus acidophilus is an obligate microorganism of bowels that is easily acclimated in a colonic bowel segment and develops. A medium unfavorable for putrefactive microorganisms. The very germ was isolated out of infant bowels by Podgaetsky I., a physician, in St. Petersburg (1903). In 1910, Gartye E.E. identified that this bacterium relaxed the bowels not only of putrefactive but of some virulent microbes as well. He recommended using *Lactobacillus acidophilus* for therapeutic and preventive purposes to control gastric- intestinal diseases in humans. At present, it has been established that this germ owns antibiotic properties and secretes antibiotics: nizin, lactalin and the like which suppress causative agents of tuberculosis, mastitis, diphtheria and other diseases.

Proteins are high molecular nitrogen-containing organic substances which molecules are composed of amino acid residues bound by peptide bonds.

Vitamers are compounds similar in chemical structure and identical in biological properties.

Vitaminized is the name for milk manufactured with vitamin C added, the product having the vitamin not under 10 mg per 100 ml milk

Vitamins (from Latin word *vita* – life) are the group of low molecular organic substances of various chemical natures needed in negligibly minor quantities versus basic foods to support vital organism functions.

Hydrogen index (pH) is a negative decimal logarithm of hydrogen ions concentration in solution.

Hydrogen bond is the interaction of a hydrogen atom with a more negative electric atom, the interaction being of both acceptor-donor nature and electrostatic nature.

Salting-out is proteins elutriation out of watery solutions caused by salts of alkali-earth metals (eg, ammonia sulfate). This is a reverse denaturation based on competition of the alkali-earth metals with proteins for water. Salting-out is used to fractionize proteins.

Gel is a structure formed by colloid particles or polymer molecules in the form of special grids, cells, which are normally filled by a solvent.

Gel formation is a basic process determining consistence of all cultured-milk stuffs.

Genotype is combination of all genes localized in body chromosomes that determines the reaction norm of an individual to environmental conditions, its viability and fertility – at large, its fate in the gene pool of a successive generation of species or population.

Hybridization is pairing of RNA and DNA complementary denatured strands, during the pairing an RNA/DNA hybrid or pairing of complementary single-stranded DNAs being produced or an RNA/DNA hybrid being formed.

Hydrophilic molecules are water-soluble molecules.

Hydrophobic molecules are the ones not soluble in water.

Glycogenolysis is the process of glycogen disintegration.

Glycogenogenesis is glycogen biosynthesis.

Glycolysis is the process of glucose disintegration in anaerobic conditions which end product is lactic acid.

Glycolipids are composite ethers of higher fatty acids and sphingosine with a carbohydrate component available in them.

Gluconeogenesis is glucose synthesis out of non-carbohydrate sources.

Homeostasis is maintenance of normal permanent internal conditions of an organism.

Deionization is elimination of ions out of a solution by ion-exchanging resins.

Deionized water is the water with low content (about 0) of ionized substances that is obtained by passing through an ion-exchange frame.

Denaturation is the destruction of proteins spatial conformation when polypeptide chains unwind (with tertiary and secondary molecule structures degrading) and hydrophobic groups come to the surface. Herewith, protein ceases to be soluble, aggregates and precipitates. The phenomenon of **denaturation** is used to qualitatively analyze the proteins presence.

Denaturizing agents are factors inducing denaturation. They are: 1) heating and radiation by higher powers (ultraviolet, X-rays, neutron, etc.), the heating is followed by breaches of hydrogen and hydrophobic bonds; 2) action of acids and alkalis that destroy electrostatic bonds; 3) ions of heavy metals forming complex compounds with protein groups, herewith, breaking down poor relations in their molecules; 4) restorers that disrupt disulfide bridges; 5) urea and guanidine chloride producing new hydrogen bonds and disrupting former ones.

Fats are composite ethers of higher fatty acids and three-atom alcohol of glycerin.

Solution jellification is the process connected with losses of fluidity in solutions of high molecular substances and sols of some hydrophobic colloids and this results in gels and jells.

Sol is a colloid solution.

Isoelectrical point is a pH value of a solution at which particles capable of interacting with both acids and bases have a summarized zero charge.

Immune globulins (antibodies) are glycoproteids, which emerge in animal blood as a response to a corresponding antigen entering a body (cells, protein or a

different high molecular compound). There are four classes of **immune globulins** found in milk: IgG, IgA, IgM and IgE. Of them only IgA synthesizes in mammary gland cells and the rest of them passes on to the milk from blood serum.

Catabolism is degradation of substances with concomitant discharge of energy.

Catalase is an enzyme decomposing hydrogen peroxide and inactive molecular oxygen. Its content in milk of healthy animals is low, but in that of sick animals or contaminated milk, the catalase level grows («catalase test»).

Enzyme catalytic center is an enzyme site responsible for catalysis. For simple enzymes, it is a unique combination of amino acid residues, which are present on different sites of a polypeptide chain; for the composite enzyme, it is a coenzyme.

Ketoses are monosaccharides with a ketogroup and several hydroxyl groups involved.

Coagulation is the process of adhering particles forming larger aggregates, which lose sedimentary tolerance resulting in separation of phases and destruction of dispersive systems.

Preservatives are substances that extend a storage period of foods and protect them against spoilage caused by microorganisms. It should be noted that there are no universal preservatives that could be applied to all types of food.

Coenzyme is a non-protein part of a composite enzyme responsible for catalysis.

Lactase (Lat. *lac*, *lactis* is milk; syn. β -galactosidase) is an enzyme of a hydrolase class that catalyzes splitting lactose into galactose and glucose. Degradation of lactose synthesis in an organism can result in hereditary disease called lactose intolerance. There is no **lactase** available in freshly drawn milk; it is secreted by lactics during their development. This enzyme displays the highest activity at 35...45°C and 6.5 pH.

Lysines are immune milk bodies that dissolve bacterial cells and foreign corpuscles entering blood.

Lysozyme is an enzyme named muramidase that, as a protective agent, is available in organism discharges: lacrimal gland liquid, saliva, intestinal juice, milk, leukocytes, etc. It is capable to dissolve bacteria through polysachharide chains of their cell walls. L.content is 30 times higher in colostrum than in blood serum.

Lipase is an enzyme that enters milk out of an animal body and splits glycerides. Its content in milk is minor and not permanent. The content grows toward the late lactation period and the growth is sometimes discerned by a bitterish milk taste, because of accumulation of hydrolysis outputs caused by lipase. The enzyme is heat fast and inactivates at over 80oC.

Lipids are natural non-polar compounds not soluble in water but soluble in non-polar solvents.

Lipolysis is hydrolytic segregation of fats.

Locus is a site of a single gene location (its certain alleles) on a chromosome or inside a segment of a DNA genome.

High-energy compound is a compound which specific bond (as a rule, phosphoether) during hydrolysis releases over 25 kJ/mol energy.

Metabolism is aggregation of all chemical reactions in a cell.

Micelle is a colloid particle that is presented by aggregation of molecules, atoms or ions enclosed by a double layer electric coating.

Swelling is the process of liquid adsorption by elastic gels with concomitant sufficient increase of galantine volume.

Oxidoreductases are a group of enzymes catalyzing oxidation-reduction reactions in living things. They are presented by oxidases, peroxidase and catalase.

Opsonins are immune milk bodies that prepare foreign microorganisms to be dissolved by blood leukocytes. Leukocytes are able to dissolve microorganisms only after having been exposed to opsonins.

Organoleptic analysis is qualitative and quantitative evaluation of the response of human sense bodies to product properties.

Pasteurized is the milk heat-treated at 63 до 95°C with different ageing time at the temperatures and then, cooled.

Peptization is a process of disaggregation or reverse coagulation facilitating sediments resulting from the coagulation to turn into a colloid solution. The process is feasible if there is no change in the composition of particles in the coagulate. The coagulate is rinsed off a coagulating electrolyte and introduced into a stabilizer medium.

Peroxidase is an enzyme that enters milk out of a mammary gland (its great amount is available in colostrums), catalyzes oxidation-reduction reactions in hydrogen peroxide presence and degrades the latter releasing active atomic oxygen. The enzyme presence is not related with bacterial infestation, but permits to determine milk-heating level (the enzyme degrades at 75...80°C).

Pesticides are toxins of chemical and biological origin applied to agriculture to protect cultivated plants against weeds (herbicides), insects (insecticides), and diseases (fungicides).

Polymer is a macromolecule composed of covalently bound replicating subunits or monomers associated with each other by a series of similar chemical reactions. Each DNA strand is a linear polymer composed of nucleotide monomers.

Polymerase is enzyme catalyzing polymer synthesis. There is a DNA-dependent RNA-polymerase catalyzing the RNA synthesis through the DNA transcription; an RNA-dependent DNA-polymerase catalyzing the DNA chain synthesis on the message RNA.

Polymerase chain reaction, PCR is the process of in vitro amplification within which a 15 kb long DNA fragment can be multiplied 10^8 (copies).

Polymorphism is when individuals existing within two or more genetically and morphologically different groups of the same population permanently cross with each other.

Primer is a short DNA or RNA oligonucleotide complementary to the site of a longer DNA or RNA molecule.

Pressing is the process affecting a cheese mass placed in a closed vessel (compression mould) by external static or dynamic loads. The process is aimed at compacting the mass, extracting hydraulically free whey, adjusting and fixing a certain geometric form of the cheese as well as making a coating of its surface layer.

Proteases are enzymes represented by proteinases (proteins split to peptides) and peptidases (peptides split to amino acids). In milk, proteolytic enzymes are mainly produced by microflora. Proteases are tolerant to heating up to 70°C and degrade at 75...80°C.

Reductase is a milk enzyme released by a mammary gland, it indicates milk bacterial infestation. **R.** facilitates the transfer of hydrogen to any compound, but oxygen. **R.** owns the property to reduce methylene blue by bleaching it. The shorter is the bleaching time, the higher is the bacterial infestation (the reductase test). At 75°C, reductase degrades completely.

Renaturation is regeneration of the native structure of denaturated protein after cooling at the expense of spontaneous recurrent coiling of chains.

Syneresis is the process of gel ageing connected with spontaneous sheeting of jellies into two phases: compacted gel and diluted sol.

Sorbitol and xylite are multi-atomic alcohols (polyols). Their sweetness makes up 0.85 and 0.6, respectively, vs. sucrose. They are fully digested by an organism. **Xylite** is a stabilizer that has moisture holding capacity and emulsifying properties; it positively influences teeth conditions and encourages secretion of gastric juice and bile.

Sterides are composite ethers of higher fatty acids and polycyclic alcohols.

Sterilized is milk that is heat-treated at above 100°C. In the milk, not only all vegetative types of microflora but also their spores are eliminated.

Substrate is the matter undergoing enzymatic exposure.

Enzyme substrate center is a site of a polypeptide chain of the enzyme to which the substrate attaches.

Thixotropy is a gel power, when exposed to mechanical action, to liquefy, and transform into sol and then, when at rest, to jellify again.

Enzymes are specific substances, which catalyze biochemical reactions.

Phosphatase is a raw milk enzyme coming from an animal organism and hydrolyzing phosphoric acid ethers. The level of phosphatase activity goes down when the milk is heat-treated. During pasteurization (at 63°C for 30 min or at 73°C for 5 min,) phosphatase inactivates completely and this is used as the test for pasteurization degree.

Pholoenzyme is a composite (two-component) enzyme.

Fucose (6-deoxigalactose) is a monosaccharide α -fucose that a structural fragment of some milk oligosaccharides, plant and bacterial polysaccharides and glycoproteins. It is obtained by hydrolysis of natural substances, eg., algae polysaccharides (fucans)

Chimosine is rennet. Its different name is labenzyme or rennin. It is developed in abomasum (the fourth gastric compartment) of young calves. **Chimosin** is capable to clot milk, has proteolytic action, but casein splits gradually and not deeply.

Chromatography is separation of substances resulting from sorption processes under the ordered motion of one of the phases of dispersive system.

Cyclomates are sodium (potassium) and calcium salts of cyclamate (aminosulfonic acid) acid that have pleasant flavor and are sustainable when cooked. They are well- soluble in water. Their sweetness is 30 times as much as saccharose. These substances are used in the production of beverages including those of milk.

Enzymology (fermentology) is the part of biochemistry that studies enzymes.

Principles forming quality of meat production

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