

QUALITY AND SAFETY INDICATORS OF POULTRY MEAT WITH DIFFERENT STORAGE METHODS

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The problem of preserving the nutritional value of meat of all types of animals and poultry is the number one problem in our state. Poultry meat is not inferior to animal meat in terms of nutritional value and technological properties, and even surpasses it in most parameters. The problem of quality control of poultry meat becomes the most important and priority, especially with increasing production and supply to Ukraine. Recently, experts have been paying attention to the influence of various factors on the quality and safety of poultry meat during storage, especially long-term storage.

The chemical composition of raw meat is an objective indicator of the nutritional value of poultry meat. It depends on the type of bird, its breed, sex, age, fatness. Therefore, the composition of meat, even one species of poultry, may be different and differ from those in the directories. In addition, poultry meat of different types has different storage conditions and periods, in case of violation of which the raw material loses its quality.

Key words: *quality and safety, chicken, turkey, micro-structural analysis, microbiological indicators, chemical composition.*

Formulation of the problem. To obtain high-quality poultry meat, you need to strictly follow the basic rules of production and storage. The main task of the agro-industrial complex of Ukraine is the production of food for the population. To maintain the normal functioning of the body, a person needs to consume per day 100-150 g of quality protein, including 65-76 g - of animal origin (approximately: 356 eggs, 80-85 kg of meat and meat products, including 16.4 kg of poultry meat).

However, in the technological chain of poultry meat production there are processes that generate serious losses, sometimes tens of percent of the cost of raw materials. Properly frozen and thawed poultry meat retains meat juice, and in violation of the conditions of technology poultry meat loses its flavor and spoils very quickly. The longer the raw material is stored, the more the structure of the tissues will differ from the initial state. Meat gradually loses juice and nutrients, becomes loose, it is actively developing microorganisms. Therefore, the main problem of the poultry industry is the maximum preservation of manufactured products.

Analyze of recent research and publications. The quality of poultry meat is influenced by both in vivo factors (poultry genotype, housing and feeding conditions) and processing and storage technology.

The chemical composition of raw materials is one of the most objective indicators of the nutritional value of poultry meat. The chemical composition of meat depends on the quantitative ratio of tissues that are part of it and depends on the type of bird, its breed, sex, age, fatness. Poultry meat, even of the same species, can be different in composition and differ from those in reference books. Also, poultry meat of different species has different conditions and shelf life, in violation of which the raw material loses its quality.

Poultry meat of different species has different amounts of water, proteins, fats and other components. The water content in raw meat can range from 45-76%, which directly depends on the fattening of the bird, and subsequently on the method of storage of raw materials.

The nutritional value of poultry meat is formed by proteins, and with a small amount of connective tissue in the raw material, the content of complete proteins increases. Poultry meat proteins have an optimal ratio of amino acids, and especially essential. The range of raw fats also directly depends on the species of bird, but the main lipids are: glycerides, phospholipids, cholesterol. During storage, the chemical composition of raw materials may change.

Poultry meat can be both a dietary product and a breeding ground for microorganisms: *E. coli*, *Listeria monocytogenes*, *Salmonella* and others. Such raw materials become dangerous for the consumer and can contribute to the development of food poisoning and toxic infections.

Most Ukrainian poultry enterprises constantly monitor the quality and safety of their products, as the consistently high quality of products, first of all, indicates the efficiency of the enterprise. [1-8]

The purpose of our work was: a comparative assessment of physical and chemical parameters of raw meat by different methods of storage and defrosting.

Material and methods of research. We studied the physicochemical parameters of raw meat of chicken (fillet and thigh) and turkey (fillet and thigh). We also studied the changes in performance during different methods of storage (cooling and freezing) and defrosting with atmospheric air.

The results of own research. We tested chilled chicken and turkey meat samples for quality indicators such as mass fraction of moisture, protein, fat and ash. All samples almost corresponded to the norm specified in the reference books.

If we compare chicken and turkey fillets, then we revealed the following indicators: the weight of one piece, g - chicken $428, 57 \pm 3.11$, turkey $1494, 38 \pm 8.67$, which is 1065.81 g more than the indicator of chicken.

The chemical composition of the fillet, the mass fraction of moisture in the chicken meat is $73.85 \pm 2.10\%$, the turkey is $73.97 \pm 3.08\%$, which is 0.12% more than the chicken. The mass fraction of fat in chicken meat is $2.31 \pm 0.11\%$, and that of turkey is $1.35 \pm 0.14\%$, which is 0.35% less than that of chicken. The mass fraction of protein in chicken meat is $23.15 \pm 1.12\%$, and in turkey meat is $23.43 \pm 1.25\%$, which is 0.28% more than that of chicken. The mass fraction of ash both in chicken meat and turkey ranged within $0.75 \pm 0.01\%$.

If we compare the thigh of a chicken and a turkey, we identified the following indicators: the weight of one piece - chicken $272, 72 \pm 2.27$ g, turkey 983.25 ± 5.79 g, which is 710.53 g more than chicken.

The chemical composition of the thigh meat, then the raw chicken contains slightly more moisture than the turkey, according to chicken $75.43 \pm 2.38\%$, and turkey $74.32 \pm 2.76\%$, which is 1.11 less than chicken. Mass fraction of fat in chicken meat is $2.31 \pm 0.11\%$, versus $3.48 \pm 0.11\%$ in turkey, which is 1.17 more than in chicken. The mass fraction of protein in chicken meat is $20.71 \pm 1.34\%$, which is 1.69% less than in turkey $22.40 \pm 1.16\%$. The mass fraction of ash in raw chicken thighs is less by 0.25% , respectively, in smokers $0.85 \pm 0.02\%$, and in turkey $1.1 \pm 0.02\%$.

From the data obtained, it can be seen that chicken and turkey meat, both fillets and thighs, are high-quality dietary products. The calorie content of chicken meat ranges from $211-220$ kcal, turkey meat - $144 - 150$ kcal. These figures indicate that the meat of the two types of poultry has approximately the same calorie content, and therefore nutritional value.

Chicken fillet contains up to 2.31 ± 0.11 hectares of fat, turkey coma - 1.35 ± 0.14 g. According to literature sources, about 5% of calories come from fat in chicken fillet, in turkey fillet about 4% .

Food protein is used for muscle building. For comparison, on average 100 g of chicken contains 23.15 ± 1.12 g of protein, and turkey 23.43 ± 1.25 , which is 0.28 more than chicken. The difference in protein is negligible, but turkey is more nutritious than chicken.

At the beginning of the experiment, the meat of each type of poultry (fillets and thighs) was weighed, placed in sterile bags and placed in a freezer. The shelf life lasted 21 days at a temperature not higher than -18 ° C. After 21 days of storage, we defrost the raw meat with atmospheric air. After complete defrosting, studies of the physicochemical parameters of raw meat were repeated in order to identify the loss of nutrients.

After freezing for 21 days and defrosting, we noticed slight deviations from the initial data. The mass fraction of moisture is preserved - chicken: fillet up to 99.15% , thigh up to 98.42% , turkey: fillet up to 99.44% , thigh up to 99.64% - the best performance in turkey,. Mass fraction of fat is preserved - chicken: fillet up to 96.97% , thigh up to 97.32% , turkey: fillet up to 97.87% , thigh up to 97.03% - - the best performance in turkey. The mass fraction of protein was preserved - chicken: fillet up to 99.13% , thigh up to 97.64% , turkey - fillet up to 99.87% , thigh up to 98.70% , turkey meat has the best indicators.

Weight of one piece, g ($M \pm m$) was: chicken - fillet $402, 23 \pm 2.26$ g ($- 6.09\%$), thighs $248, 44 \pm 3.76$ g ($- 8.91\%$); turkey - fillet 1456.13 ± 6.11 g ($- 2.56\%$), thigh 949.41 ± 5.66 g ($- 3.45\%$).

Thus, turkey meat, regardless of the type, during long-term storage and further defrosting with the help of atmospheric air has less loss of nutrients, moisture and total mass.

The quality of raw meat (chicken and turkey fillets, chicken and turkey thighs) was assessed according to microbiological indicators: the total number of bacteria (MAFAM), E.coli bacteria, pathogenic microorganisms, including bacteria of the genus Salmonella and Staphylococcus aureus.

Microbiological indicators regarding the amount of MAFAM fluctuate within the norm (5.0×10^6) in all raw materials both chilled and after freezing (for 21 days) and defrosting with atmospheric air (18 °C): raw materials: chicken fillet - $3.35 \times 10^4 / 4.18 \times 10^4$, chicken thigh - $5.98 \times 10^4 / 6.25 \times 10^4$, turkey fillet - $3.78 \times 10^4 / 3.97 \times 10^4$, turkey thigh - $6.21 \times 10^4 / 6.17 \times 10^4$.

acteria of the *Escherichia coli* group (coliform) in 0.001 g in all samples of raw meat, both chilled and frozen and after defrosting with atmospheric air were not detected.

Coagulase-positive staphylococci of 0.01 g were not detected in all samples of raw meat, both chilled and frozen, and after defrosting with atmospheric air.

Pathogenic microorganisms, as well as *Salmonella* and *Listeria monocytogenes* in 25 g in all samples of raw meat, both chilled and frozen, and after defrosting with atmospheric air were not detected.

This indicates that the meat products of both chickens and turkeys have good sanitation both in the refrigerated state and after freezing and defrosting with atmospheric air.

Microstructural analysis of raw meat.

Chicken's meat. During the histological analysis of fillets (x100), we noticed that the meat is chilled: the structure of the fibers is the same in most fields of view, homogeneous, the shape of 80% of the fibers is the same, they fit tightly to each other. Small foci and sometimes layers of connective tissue are noted between some fibers. Such changes can develop during storage of raw materials for up to 2 days.

On histological preparations from meat raw materials of the thigh, we also noted that muscle tissue belongs to chilled raw materials, but there are certain differences from fillet meat: the fibers stratify due to increased interstitial edema and lose their integrity. In some fields of vision, areas of connective tissue are noted.

Turkey meat. During the histological analysis of fillets (x100), we noticed that the raw meat is chilled: the structure of the fibers is the same in most fields of view, homogeneous, the shape of 85% of the fibers is the same, they adjoin each other. Between the fibers, foci of connective tissue are revealed.

On preparations from thigh meat, fiber stratification due to edema is more common, the loss of striation, the integrity of the fibers is broken. Areas of connective tissue are noted between the fibers.

Changes in raw meat during freezing and defrosting by air.

When freezing and defrosting in air, the changes in both chicken meat (fillet and thigh) and turkey meat (fillet and thigh) are almost identical and correspond to the changes inherent in frozen raw meat, which is defrosting with the help of air. Significant deformation of muscle fibers, loss of striation and nuclei are noted. Some fibers are fragmented and divided into parts.

As a result of the development of crystallization processes during freezing, both between the fibers and in the thickness of them, voids and wall breaks appear in the latter. Large crystals in the process of formation roughly distorting and destroying all surrounding tissues. The tissue exfoliates, becomes friable, fragmented. The gaps between the fibers both in the fillets(chicken and turkey) and in the thighs are significant due to fluid loss after defrosting.

The structure of the meat during freezing and defrosting is not completely restored. Ice crystals injure the fibers when frozen in the fibers and voids appear around them. Changes in the surface of the fibers are noted, which become uneven, bumpy, and torn.

Conclusions

1. Meat of all types of poultry has certain characteristics: poultry meat is dense, which is associated with thicker, coarser and finer-grained fibers, in addition, it contains less connective tissue.

2. Meat products of both chicken and turkey have a good sanitary condition, in all samples of meat raw materials as chilled, frozen and after defrosting with atmospheric air, which is confirmed by the absence in the samples: *E. coli* bacteria, coagulase-positive microorganisms, pathogenic microorganisms, and *Salmonella* and *Listeria monocytogenes*.

3. Turkey meat, regardless of the species, during long-term storage and further defrosting with the help of atmospheric air has less loss of nutrients, moisture and total mass.

4. During the histological analysis of raw chicken and turkey meat, it was noted that the meat is chilled: the structure of the fibers is the same in most fields of view, homogeneous, the shape of 80-85% of the fibers is the same, they fit tightly to each other. Small foci and sometimes layers of connective tissue are noted between some fibers.

5. When freezing and defrosting in air, changes in both chicken meat (fillet and thigh) and turkey meat (fillet and thigh) are almost identical and correspond to the changes inherent in frozen raw meat, which is defrosting with the help of air. Significant deformation of muscle fibers, loss of striation and nuclei are noted. Some fibers are fragmented and divided into parts.

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ПОКАЗНИКИ ЯКОСТІ І БЕЗПЕЧНОСТІ М'ЯСО ПТИЦІ ЗА РІЗНИХ УМОВ ЗБЕРІГАННЯ

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Проблема збереження харчової цінності м'яса всіх видів тварин та птиці є проблемою номер один в нашій державі. М'ясо сільськогосподарської птиці за показниками харчової цінності та технологічними властивостями не поступається м'ясу тварин, а за більшістю параметрів навіть перевершує його. В сучасних умовах світової птахопереробної галузі, коли відмічається збільшення обсягів виробництва та постачання продукції в Україну, проблема контролю якості цієї продукції стає найголовнішою і першочерговою. Останнім часом фахівці звертають увагу на вплив різноманітних чинників на якість і безпечність м'яса птиці під час його зберігання, особливо тривалого.

Хімічний склад м'ясної сировини є об'єктивним показником поживної цінності м'яса птиці. Хімічний склад м'яса залежить від виду птиці, її породи, статі, віку, вгодованості. Тому за складом м'ясо птиці, навіть одного виду, може бути різним і відрізнятися від показників у довідниках. Крім того, м'ясо птиці різних видів, має різні умови і терміни зберігання, при порушенні яких сировина втрачає свою якість.

Ключові слова: *якість і безпечність, курка, індичка, мікроструктурний аналіз, мікробіологічні показники, хімічний склад.*

ПОКАЗАТЕЛИ КАЧЕСТВА И БЕЗОПАСНОСТИ МЯСА ПТИЦЫ ПРИ РАЗНЫХ СПОСОБАХ ХРАНЕНИЯ.

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Проблема сохранения пищевой ценности мяса всех видов животных и птицы является проблемой номер один в нашем государстве. Мясо птицы по показателям пищевой ценности и технологическим свойствам не уступает мясу животных, а по большинству параметров даже превосходит его. В современных условиях мировой отрасли по производству и переработке птицы, когда отмечается увеличение объемов производства и поставки продукции в Украину, проблема контроля качества этой продукции становится главной и первоочередной. В последнее

время специалисты обращают внимание на влияние различных факторов на качество и безопасность мяса птицы во время его хранения, особенно длительного.

Химический состав мясного сырья является объективным показателем питательной ценности мяса птицы. Химический состав мяса зависит от вида птицы, ее породы, пола, возраста, упитанности. Поэтому химический состав мяса птицы, даже одного вида, может быть различным и отличаться от показателей в справочниках. Кроме того, мясо птицы разных видов, имеет различные условия и сроки хранения, при нарушении которых сырье теряет свое качество.

Ключевые слова: *качество и безопасность, курица, индейка, микроструктурный анализ, микробиологические показатели, химический состав.*