

HYGIENIC EVALUATION OF THE CHICKEN MEAT THAT IS SOLD IN ODESSA DISTRIBUTING FACILITIES

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The article presents the data about some hygienic indexes of the chicken meat that is sold in Odessa distributing facilities. It was established and analyzed the chicken meat biochemical composition from the chicken which is obtained in industrial and domestic conditions. It was established organoleptically the dubious freshness of some samples (16,7 %). It was also proven that organoleptic studies should be supplemented with the bacterioscopic and other laboratory tests. Bacterioscopic examination revealed samples in which the growth of microorganisms was established. This microorganisms can cause outbreaks of foodborne toxicosis and toxicoinfections.

Key words: *chicken meat, bacterioscopy, the biochemical composition, the bacterial contamination, safety, quality.*

Formulation of the problem. Chicken meat is a valuable product that is widely used in diets, diets of children and the elderly. Chicken meat is often chosen because of its cheapness compared to other types of meat. However, this product is perishable. Therefore, in violation of storage and the sale conditions, chicken meat can pose a threat to human health.

Analysis of current research. Poultry farming is one of the most developed and competitive types of agribusiness. The poultry products (meat, eggs) are important elements of the diet of most of the population. The main world exporters of the poultry meat are Brazil (35.6%), the USA (31.4%) and the EU (11.1%). The part of Ukraine occupies only 1.2 % [3]. The 50 % of the poultry stock of all species are concentrated in the Vinnitsa, Kiev, Dnieper and Kherson regions in Ukraine [3, 4]. Almost a fifth of all households are large poultry enterprises of well-known brands [4].

Poultry is a valuable dietary product that is in demand all over the world. It is more mature and balanced in amino acid composition [5], contains polyunsaturated fatty acids, and B vitamins. The low content of collagen in it contributes to its better digestibility by the human body. So the degree of digestibility of poultry meat is 80 %. Its amino acid composition is represented by various amino acids, among which the most important are lysine, leucine, isoleucine, valine. The nutritional and taste benefits of poultry meat are largely determined by the amount of fat [8].

The main type of meat research in the laboratories of the veterinary and sanitary expertise in the markets is organoleptic. Poultry meat is a perishable product and it requires the special conditions of storage and sale. There are a number of studies indicating the positive effect of the lactate-containing aqueous solutions, the solutions of acetic acid, the spices on the microbiological and organoleptic characteristics of chicken meat during storage [1, 7, 11, 15].

At the present stage, special attention is paid to the safety and quality of food products, including the chicken meat. Now the process of adaptation of Ukrainian legislation to European requirements is underway. This will allow to bring large volumes of domestic products to the world market [2]. The experience of obtaining organic chicken meat, which provides for the rejection of antibiotics, hormones, enzymes and other synthetic compounds in the composition of compound feeds for poultry, is becoming relevant [6].

A special place in ensuring the quality and safety of chicken meat is to prevent its seeding by microorganisms that can cause foodborne infections and toxicosis. Meat contamination can be carried out in various ways: both during production, and during transportation, storage, sale [7, 11]. The risk of cross-seeding of poultry carcasses increases during the cooling process [9]. Dangerous pathogens that are secreted in poultry carcasses are *Salmonella* [10], *Campylobacter spp.* [9, 14], *E. coli* [12, 13].

The aim of the article. The aim of the work was to determine individual indicators of safety and quality of chicken meat, which is implemented in the trading network of Odessa.

Materials and methods. The studies were carried out on the basis of the Multidisciplinary Laboratory of Veterinary Medicine of Odessa State Agrarian University and in the laboratory of Department of Hygiene, Sanitary and Expertise of Odessa State Agrarian University.

It was studied 6 chicken carcasses. The carcasses of 1st and the 2nd samples were bought respectively in a chair of stores «Fresh meat» and «Eco meat»; the 3rd and the 4th samples were bought in the meat buildings of «Privoz» and «Pivnichny» markets; the 5th and the 6th samples were bought in Odessa spontaneous markets. The 1st and the 2nd carcasses were industrial production, the 3rd–6th carcasses were domestic chicken.

The organoleptic assessment was carried out according to the current standard (SSTU 3143-2013 – Poultry meat (carcasses). General specifications).

The biochemical composition of the samples was determined by the equipment FoodScan and the software for the device ISISCAN. We conducted the research of the surface prints and the dipper prints from the carcasses with the purpose to establish the degree of freshness. Also we were examined the chicken meat extract for ammonia and ammonium salts (with Nessler's reagent).

The bacteriological research was carried out according to the generally accepted methods. We determined the Total Bacterial Contamination (SST 7702.2.1-95); the Coliform Bacteria (SST 7702.2.2-93); *Staphylococcus aureus* (SST 7702.2.4-93); *Proteus* (SST 7702.2.7-95); enterococci (SST 7702.2.2-93); pathogens, including salmonella (SST 7702.2.3-93); listeria (SSTU ISO 11290-1:2003).

Presenting of the main material. It was founded by the organoleptic research that the V sample, which was bought on the spontaneous Odessa market, has the intensive, unpleasant, musty smell. This indicates its dubious freshness. There was no doubt about its freshness according to the other organoleptic parameters. The I, II, III, IV, VI are recognized as fresh according to the results of the organoleptical research. Their organoleptic characteristics met the requirements of the current standard (SSTU 3143-2013 – Poultry meat (carcasses). General specifications). So the percentage of dubious freshness chicken carcasses was 16,7 % relative to the total number of samples which were studied

We studied such parameters as ash percentage, protein, fat, humidity during the biochemical research of the chicken meat. The results presented in the table 1.

Table 1. The biochemical composition of the chicken carcasses (M±m, n=6)

Place of selection	№ of the sample	Parameters, %			
		ash	protein	fat	humidity
«Fresh meat»	I	0,7±0,01	16,0±0,5	14,7±0,2	68,6±1,2
«Eco meat»	II	0,6±0,02	14,5±0,3	12,9±0,6	72,0±2,5
«Privoz»	III	1,0±0,01	19,0±0,7	13,7±0,5	66,3±1,1
«Pivnichny»	IV	0,7±0,01	21,0±0,4	13,6±0,8	64,7±2,1
Spontaneous market	V	1,0±0,01	18,0±0,5	15,8±0,3	65,2±2,7
Spontaneous market	VI	1,0±0,01	20,5±1,1	11,4±0,3	67,1±1,9
The average value	-	0,8±0,01	18,2±0,6	13,7±0,5	67,3±1,9

The table shows that the highest ash content was in III, V and VI samples. The indicator was the same and amounted to 1,0±0,01 %. The lowest ash content was in II sample – 0,6±0,02 %. The protein content was the highest in IV and VI samples, which were bought respectively on the market «Pivnichny» and on spontaneous market of Odessa. The indicators were respectively 21,0±0,4 and 20,5±1,1 %. The lowest protein content was in II sample, which was bought in the chair of stores «Eco meat» – 14,5±0,3 %. As for the fat content, V sample from the spontaneous market was the fattest (15,8±0,3 %). The VI sample from the spontaneous market of Odessa had the lowest fat content – 11,4±0,3 %. The highest humidity was in II sample (from the store «Eco meat») 72,0±2,5 %. Generally the average biochemical content of the chicken meat which is realized in the commercial chain of Odessa was as follows: ash – 0,8±0,01 %, protein – 18,2±0,6 %, fat – 13,7±0,5 % and humidity – 67,3±1,9 %. It characterizes the chicken meat as a completely dietary product. The industrial chicken meat was characterized by less ash content (0,65 %), it is less than the rate of domestic chicken by 38,5 %. The domestic chicken meat evaluated the industrial chicken meat by the protein content on 27,1 %. As for the fat content the industrial and the domestic chicken meat was almost the same (respectively 13,8 and 13,6 %). The industrial carcasses were characterized by higher humidity (the parameter evaluated the parameter of the domestic carcasses by 6,8 %). The bacterioscopy research was carried out with the purpose to confirm the conclusions regarding to the dubious freshness of the chicken carcasses which were obtained in the

course of epy organoleptic research. Also the samples were investigated for ammonia and ammonium salts. The results of bacterioscopy research are presented in the table 2.

Table 2. The results of bacterioscopy research of the chicken carcasses (M±m, n=6)

Place of selection	№ of the sample	The quantity of microorganisms		Conclusion
		superficial layers	deep layers	
«Fresh meat»	I	4,5±0,2	0	Fresh
«Eco meat»	II	3,8±0,1	0	Fresh
«Privoz»	III	12,6±0,8	7,5±0,4	Doubtful freshness
«Pivnichny»	IV	6,8±0,5	2,5±0,1	Fresh
Spontaneous market	V	21,6±1,3	15,4±1,2	Doubtful freshness
Spontaneous market	VI	6,5±0,4	3,2±0,2	Fresh

So, the bacterioscopy research confirmed the doubtful freshness of V sample, which were bought on the spontaneous market of Odessa. It also made it possible to establish dubious freshness of III sample which was bought on agrofood market «Privoz» in Odessa. This sample was recognized as fresh during an organoleptic study. The presence in the samples of chicken meat of ammonia and ammonium salts indicates the presence of a process of protein breakdown (a spoilage). We studied the ammonia and ammonium salts content in the samples of chicken meat which is realized in the commercial chain in Odessa using Nessler's reagent. The results are presented in the table 3.

Table 3. The degree of freshness of chicken carcasses (n=6)

Place of selection	№ of the sample	The method for the determination of ammonia and ammonium salts	Conclusion
«Fresh meat»	I	The meat extractor is green-yellow, transparent	Fresh
«Eco meat»	II	The meat extractor is bright yellow, cloudy, the sediment is present	Doubtful freshness (thawed meat)
«Privoz»	III	The meat extractor is yellow, cloudy, the sediment is absent	Doubtful freshness
«Pivnichny»	IV	The meat extractor is green-yellow, transparent	Fresh
Spontaneous market	V	The meat extractor is yellow, cloudy	Doubtful freshness
Spontaneous market	VI	The meat extractor is green-yellow, slightly cloudy, without the sediment	Fresh

III and V samples were recognized as the doubtfully freshness. So, it was respectively established the yellow and intensive yellow color of the meat extract and its cloudy during a reaction with Nessler's reagent. The extract was within the sediment.

It should be noted that the doubtful freshness of the samples has been confirmed by bacterioscopy research. As for V sample its dubious freshness also has been confirmed by organoleptic research.

II sample, which was bought in the shop «Eco meat» (Odessa), was recognized as fresh during the organoleptic and bacterioscopy research. But it showed herself in the reaction with Nessler's reagent as doubtful fresh (as a thawed meat) although the chicken meat was sold as chilled. The extract from this sample was bright yellow and cloudy. The sediment was visualized at the bottom of a tube.

The results of the bacteriology research are presented in the table 4. The results, which are presented in the table show, that the chicken meat which is realized in Odessa distributing facilities can be the source of foodborne toxicosis and toxicoinfections (II, III and V samples).

The analysis shows that the Total Bacterial Contamination of chicken carcasses was within $1,6 \times 10^4 - 5,9 \times 10^2$ CFU/g.

The Coliform Bacteria were absent in I, IV and VI samples. The growth of *E. coli* has been detected in III and V samples (respectively $2,3 \times 10^2$ and $1,9 \times 10^2$ CFU/g. Also in III and V samples has been detected the *Proteus* growth (respectively the titers were 0,01 and 0,1). It was established the colonies of *Staph. aureus* ($0,5 \times 10^2$ CFU/g) in V sample.

Salmonella and *L.monocytogenes* were not identified in any sample.

Table 4. The results of bacteriology research of chicken meat that is realized in Odessa distributing facilities (n=18)

№ of the sample	Indicators							
	Total Bacterial Contamination, CFU/g	Coliform Bacteria, CFU/g	<i>E. coli</i> CFU/g	<i>Proteus</i> , titer	<i>Staph. aureus</i> , CFU/g	<i>Salmonella</i> , CFU per 25 g	<i>L. monocytogenes</i> , CFU per 25 g	<i>Enterococcus</i> , CFU/g
I	1,8×10 ⁴	0	0	0	0	0	0	0
II	3,5×10 ⁴	1,2×10 ²	0	0	0	0	0	0,4×10 ²
III	5,1×10 ²	6,310 ²	2,3×10 ²	0,01	0	0	0	0,7×10 ²
IV	1,6×10 ⁴	0	0	0	0	0	0	0
V	5,9×10 ²	7,1×10 ²	1,9×10 ²	0,1	0,5×10 ²	0	0	2,0×10 ²
VI	2,0×10 ⁴	0	0	0	0	0	0	0

Note: CFU – Colony Forming Units.

Conclusions and prospects for further research. It was established organoleptically that 16,7 % of chicken carcasses samples, which were selected in different places of Odessa distributing facilities, were dubious freshness.

The average biochemical content of chicken meat which is realized in Odessa distributing facilities was as follows: ash – 0,8±0,01 %, protein – 18,2±0,6 %, fat – 13,7±0,5 % and humidity – 67,3±1,9 %. This characterizes the chicken meat as a completely dietary product.

It doesn't enough the organoleptic research for establish the quality of the chicken meat. So, during the bacterioscopy research and during the study of ammonia and ammonium salts it was established the dubious freshness of two samples (III and V samples). Also it was revealed the dubious freshness of II sample which proved itself in the reaction with Nessler's reagent as thawed product (the percent of dubious freshness carcasses was 50 %).

The chicken meat which is realized in Odessa distributing facilities can be the potential source of foodborne toxicosis and toxicoinfections as insufficient heat treatment. So there are the *Coliforms* in 3 samples, *E. coli* and *Proteus* in 2 samples. It was founded the growth of *Staph. Aureus* (V sample). *Salmonella* and *L.monocytogenes* were not identified in any sample.

Further research is planned to study the safety and quality of chicken offal.

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ГІГІЄНІЧНА ОЦІНКА КУРЯЧОГО М'ЯСА, ЩО РЕАЛІЗУЄТЬСЯ У ТОРГІВЕЛЬНІЙ МЕРЕЖІ М. ОДЕСИ

Півень О.

У статті представлені дані щодо окремих гігієнічних показників курячого м'яса, яке реалізується у торгівельній мережі м. Одеси. Вивчено та проаналізовано біохімічний склад курятини, отриманої за промислового виробництва, та за домашнього вирощування. Органолептичним дослідженням встановлено сумнівну свіжість окремих зразків (16,7 %) та доведено необхідність доповнення даного виду дослідження бактеріоскопічним та іншими лабораторними дослідженнями. Бактеріологічним дослідженням виділено зразки, у яких встановлено ріст мікроорганізмів, що можуть спричинювати спалахи харчових токсикозів та токсикоінфекцій.

Key words: куряче м'ясо, бактеріоскопія, біохімічний склад, бактеріальна контамінація, якість, безпечність.

ГИГИЕНИЧЕСКАЯ ОЦЕНКА КУРИНОГО МЯСА, КОТОРОЕ РЕАЛИЗУЕТСЯ В ТОРГОВОЙ СЕТИ Г. ОДЕССЫ

Пивень О.

В статье представлены данные отдельных гигиенических показателей куриного мяса, которое реализуется в торговой сети г. Одессы. Изучен и проанализирован биохимический состав курятины, полученной в промышленных и домашних условиях. Органолептическим исследованием установлена сомнительная свежесть отдельных образцов (16,7 %) и доказана необходимость дополнения даного вида исследования бактериоскопическим и другими лабораторными исследованиями. При бактериологическом исследовании выявлены образцы, в которых установлен рост микроорганизмов, способных стать причиной вспышек пищевых токсикозов и токсикоинфекций.

Ключевые слова: куриное м'ясо, бактериоскопия, биохимический состав, бактеріальна контамінація, качество, безопасность.