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## **INNOVATIVE, RESOURCE SAVING TECHNOLOGY OF PROCESSING POULTRY COMBS**

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The poultry processing industry is actively developing all over the world, supplying consumers with such valuable protein products as eggs and poultry meat. In line with the huge volumes of these basic products of the poultry industry, numerous poultry processing enterprises produce a large number of solid by-products in the form of heads, legs, bones, entrails and feathers. Inefficient disposal of these wastes leads to environmental pollution, disease, and the loss of useful biological resources such as protein, enzymes, and lipids [1]. Substantiation of ways of rational use of secondary raw materials, ensuring the growth of the industrial potential of the industry, expanding the range of products and increasing the yield per unit of processed raw materials are of particular scientific and practical interest. The most promising are applied aspects related to the production of food, therapeutic and prophylactic and special products aimed at meeting the needs of different segments of the population in nutrients, mainly in proteins [2].

The by-product of poultry processing, combs – primarily hens, roosters and broilers combs – are characterized by a relatively high content of essential amino acids. Despite the fact that the proteins of chicken and rooster combs are somewhat inferior to the proteins of chicken meat in terms of essential amino acids, their biological value is much higher than collagen-containing raw materials [3,4].

Combs of hens and roosters are a source of hyaluronic acid, (HA). Hyaluronic acid is a natural mucopolysaccharide with high molecular weight, viscosity, elasticity and good water and protein binding capacity.

Hyaluronic acid is a natural polyanionic polymer occurring as a linear polysaccharide consisting of glucuronic acid and nitrogen – acetylglucosamine repeats through a  $\beta$ -1,4 bond. It is the most versatile macromolecule present in the connective tissues of all vertebrates. Hyaluronic acid has a wide range of

applications due to its excellent physical and chemical properties such as biodegradability, biocompatibility, non-toxicity and non-immunogenicity [5, 6].

The practical method of the industrial processing of poultry combs is their fermentation with a concentrates of bifidobacteria and propionic acid bacteria these positively effecting the hydrolysis of hen combs [7]. The authors of the study state that all technological parameters have a significant impact on the degree of hydrolysis. A higher temperature and a longer hydrolysis period increased the level of hydrolysis, while the effect of the amount of bacterial concentrate depended on the type of microorganisms. The results of biochemical, microscopic and dispersed analysis confirm the possibility of hydrolysis due to an increase in the pH level and titratable acidity, changes in structural components, and an increase in the amount of smaller protein particles. Thus the hydrolysates derived from hen by-products might become a potential protein source as functional ingredients in food systems [7].

Considering the above information we have studied the issues of expanding the range of by-products through the processing of raw materials from the processing of poultry carcasses, which are scarcely used for the manufacture of food products. For this purpose, a technology for processing combs of chickens and roosters was developed and studies of their quality indicators were carried out. Heads are processed without separation of the combs, while they can complete the range of poultry offal as a separate product. Unfortunately, the issue of proper creation of prerequisites for the rational and integrated use of by-products has not been studied in sufficient way. Therefore, it is important to look for prospects for their use to expand the range and yield of useful products, to ensure the possibility of waste-free production, etc. We took such by-products as combs of hens and roosters as a basis, the said by-products not having been used for food production until now.

The study of the physical and chemical composition, the quantitative content of the main microelements, and the amino acid composition was carried out in the laboratories of the Meat Products Technology Department and the Department of Analytical Research and Food Quality of the Institute of Food Resources of the National Academy of Agrarian Sciences of Ukraine using standard and generally accepted methods.

The object of research was by-products, namely scallops of chickens and roosters, obtained at the poultry processing enterprises of Farm Enterprise "Ular" (Lviv region) and "Magrok" LLC (Dnipro). The physical and chemical parameters of combs of hens and roosters were determined. The samples were selected and prepared in accordance with the current regulatory documents. The results are summarized in Table 1 [8].

Table 1 Physical and chemical parameters of hen and roosters combs

Sample	Content, % (by mass)				Bound water to meat, %	Bound water to overall water content, %	pH
	Protein	Water	Fat	Ash			
Sample 1 originating from Farm Enterprise “Ular”	12.11±0.09	85.82±0.19	1.24±0.22	0.84±0.24	54.41±0.20	75.22±0.19	6.53±0.25
Sample 2 originating from “Magrok” LLC	16.21±0.12	81.95±0.15	1.06±0.11	0.78±0.25	51.03±0.22	71.15±0.21	6.64±0.23

Analyzing the obtained results, we can conclude that, according to the physical and chemical parameters, the combs of hens and roosters have important characteristic properties. In particular, these are: high moisture content, a significant part of which (up to 75%) is in a bound state, low fat content. The pH value is close to neutral. In combs, a high content of macro- and microelements was found in comparison with the meat of chickens of the first category: the content of iron is 15 times more, zinc – 2 times, chromium – 112 times. It was also found that there are no limiting amino acids in chicken scallops.

Taking into account the results of the experiments described above, as well as the results described in detail [8], a flow chart for processing combs of hens and roosters was developed, shown in Fig. 1.

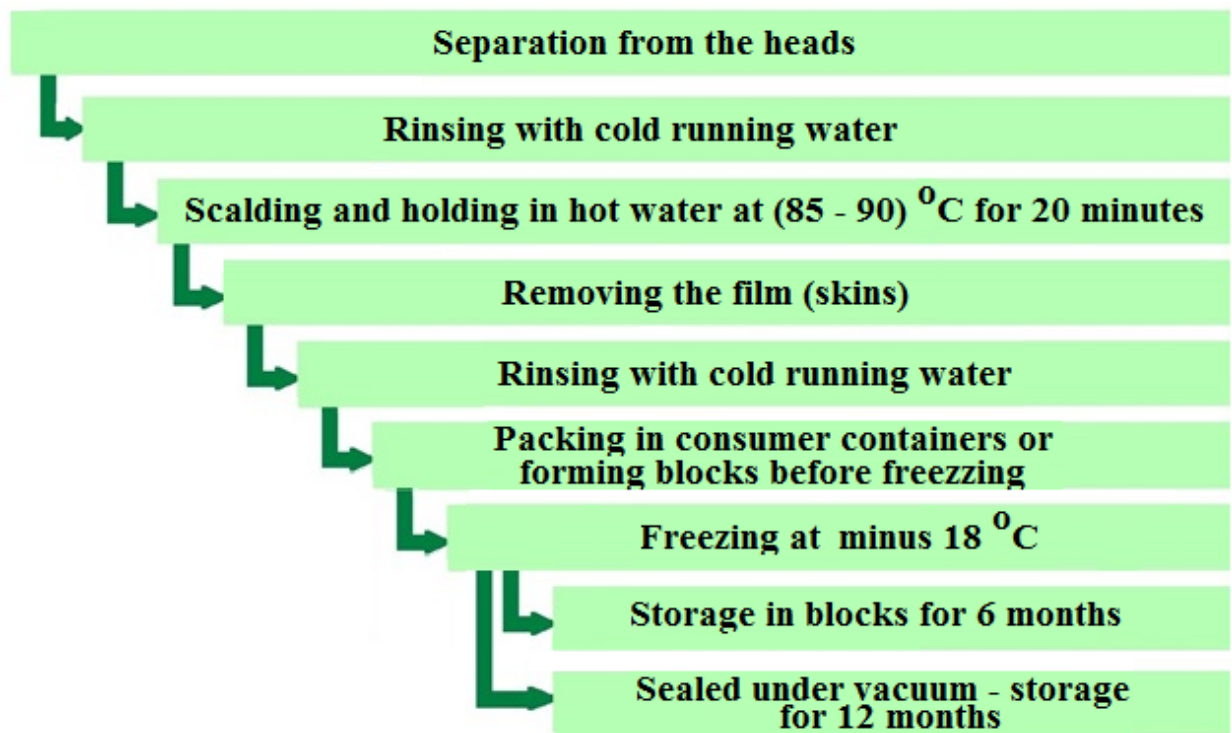


Figure 1. Flow chart of production combs of hens and roosters

#### Conclusion.

The performed studies allowed assessing the current state of processing poultry meats and poultry by-products. Based on the results of this assessment, we can state that the use of combs of hens and roosters as a valuable by-product and raw material for the development of delicacy products that are complete in terms of nutritional and biological value is possible and expedient.

In general, the effective innovative use of secondary raw materials from poultry processing provides an improvement in the production potential of the poultry processing industry, and this also makes it possible to expand the range of poultry food products. In particular, the above applies to the combs of hens, roosters and chickens, since at present the use of this raw material in domestic production practice is limited. This situation is unacceptable, since different comb dishes are used as food by the nations of the Far East, and can be exported to countries where this product is traditional. These by-products contain muscles, adipose and connective tissues, which are modified by action of enzyme systems of microorganisms in different ways. It is also possible and expedient to use poultry combs as a raw material for the cosmetic and medical industries – for this purpose, appropriate technologies should be developed.

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