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Quality and safety aspects of semi-finished meat and chopped by-products made for public consumption

Pîrlog Alisa Emilian[1],

Curchi Diana Vasile[2],

Pavlicenco Natalia Ivan[3]

[1] PhD in agricultural sciences, associate professor, department, animal resources and food safety *Technical University;* Republic of Moldova

[2] PhD in chemical sciences; head of laboratory; *Republican Diagnostic Center;* Republic of Moldova

[3] PhD in biological sciences, university lecturer; *Technical University;* Republic of Moldova

Abstract.
In the current market conditions, quality has become a determining element for satisfying consumer requirements. A special place is occupied by the manufacture of products with high organoleptic characteristics and which have a long sales perspective, without changing the quality of the product. The researches were carried out on semi-finished meat and chopped by-products - Cighiri, ("Homemade Cighiri"), manufactured by two local producers (Sample I and Mostra II) and collected from the consumer network in a refrigerated state. The organoleptic characteristics studied in the samples taken in the study demonstrated qualitative sensory indices, physico-chemical indices evaluated in semi-finished meat products and shredded by-products - Cighiri, presented concrete values and corresponding to the samples of homemade Cighiri taken in the study, the results are compliant and correspond to the requirements regulations in force Government decision 624/2020, for these products. The microbiological parameters determined at homemade Cighiri, taken in the study, demonstrated results that tell us about the absence of pathogenic microorganisms and, also about the sanitation, compliance and safety of meat products made for public consumption.

Keywords:
Indices organoleptic
physico-chemical and microbiological
Meat semi-finished products and chopped by-products - Cighiri

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INTRODUCTION

In the current market conditions, quality has become a determining element forsatisfying consumer requirements. A special place is occupied by the manufacture of products with high organoleptic characteristics and which have a long sales perspective, without changing the quality of the product.

So, quality is a right of consumers with direct effects on life, and the issue focused on food quality is permanently in the center of attention of the bodies established to guarantee their safety and to defend the interests of consumers, above all their best price, health status. So, the human right to food is an obligation of the state that must respect, protect and fulfill this standard through the legislation and the programs it undertakes, (Banu, C. et al. 2007).

Today, more than ever, it is necessary to increase the production of foods with superior nutritional value and improve the nutrition of the entire population in this way, the more complex valorization of raw materials, the diversification of production, the creation of availability for export, the raising of quality and the improvement of the presentation of products . In this sense, it is necessary, on the one hand, to know the quality conditions of the finished products, and on the other hand, to know certain elements of the technological processes and their influence on the quality of the products. Taking into account the fact that the demanding consumer wants to use quality food products, which satisfy their nutritional and aesthetic requirements, but at the same time maintain their health. Therefore, food intended for human consumption must be in a triple position to please, nourish and be free of harmful factors for health, (Laslo, C. 1997; Stănescu, V. et al. 2010).

Making products for large communities, specialists in the food industry become responsible for the health of the population, participating in one of the most effective ways of promoting and protecting health (Petroman, C. et al. 2006; Stănciuc, N. et al. 2009).

Thus, in order to produce high-quality products that meet all requirements and at the same time to avoid particularly large economic losses as a result of the appearance of waste,

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a rigorous scientific follow-up of the production process is required, from the harvesting of the raw material to consumer, (Morari-Pirlog, A. 2017).

MATERIAL AND METHODS

The research was carried out on semi-finished meat and chopped by-products - Cighiri ("Homemade Cighiri"), manufactured by two local producers and collected from the consumer network in a refrigerated state. The evaluation of the quality and safety parameters of semi-finished meat and chopped by-products - Cighiri made for public consumption, was carried out by evaluating two batches of "Homemade Cighiri" from two local producers, by taking six samples for each batch in the part that later in the text will be cited respectively as sample I and sample II.

The laboratory evaluations were carried out within the Republican Center for Veterinary Diagnostics, in the Animal Food Products Testing Laboratory, where the laboratory analyzes were carried out according to all qualitative and safety indicators in accordance with the normative acts in force, for this category of products. Organoleptic, physico-chemical, microbiological and toxic element evaluations were carried out.

The results obtained were processed by the biometric method Mercureva E., (1983), and compared with the normative requirements in force for this category of products - HG 624/2020 regarding the approval of quality requirements for meat preparations and products; GD no. 221/ 2009 - Rules regarding microbiological criteria for food products; GD no. 520/ 2010 - Health regulation regarding contaminants in food products.

RESULTS AND DISCUSSION

Currently, economic agents introduce on the market minced meat products - semi-finished products as diversified as possible and in more advantageous conditions than in the household.

A new product introduced on the market of the Republic of Moldova are Cighiris, which are sold in a refrigerated or frozen state, and consumer demand for these products has a greater weight during the cold period of the year, being accessible both in terms of value and quality.

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The semi-finished meat and chopped by-products studied - Cighirii from two local producers, were qualitatively assessed according to all the indices stipulated in the requirements of the normative acts in force for this product category HG 624/2020. Thus, laboratory investigations have organoleptic characteristics, which present us with sensory assessments, regarding the external appearance, consistency, smell, taste, shape, etc.

Therefore, from an organoleptic point of view, semi-finished products made of minced meat - Cighirii have demonstrated qualitative indices of external appearance, color, taste, smell, consistency, appearance in section, shape, etc., and which fall within the admissible limits of the normative acts in force to this product category HG 624/2020.

Sample - I of Cighiri presented a clean surface, slightly moist, fashioned in a well-defined shape, whole. In the section the cuts are of different shapes and sizes of meat and offal with and without bacon and soft consistency. Color from light gray to brown. Moderately spicy and suitable for salting. The characteristic smell of meat preparation assortments, pleasant and without foreign smell and taste.

Figure 1
Sample - I

Figure 2
Sample - II

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Table 1

Organoleptic characteristics of meat semi-finished products and chopped by-products - Cighiri

Indices	Normative requirements	Obtained results		Normative Data for test methods
		,,semi-finished meat and chopped by-products - Cighiri" Sample - I (n=6)	,,semi-finished meat and chopped by-products - Cighiri" Sample - II (n=6)	
External appearance	Full shape, well defined, surface clean, slightly moist	Whole ,,semi-finished meat and chopped by-products - Cighiri", shaped in fat paste, well-defined shape, with a clean, slightly moist surface.		GOST 9959-91
Section view	Pieces of various shapes and sizes with inclusions of crushed spices	Pieces of various shapes and sizes with inclusions of crushed spices		
Consistency	Soft	Soft		
Color	Light gray to brown	The color is light gray to brown		
Smell	Is characteristic of the product	Characteristic of the assortment of meat preparation, pleasant, without foreign smell		
Taste	Is characteristic of the product	After heat treatment, characteristic of the respective type of product, suitable for salty, moderately spicy, without foreign taste		

For Cighirii from Sample - II the same or registered appreciable characteristics that ensure the consumer confidence through the product that consumes it. Thus, the organoleptic indices assessed for the semi-finished products taken in the study presented a well-defined product shape, clean surface, slightly moist, shaped in a fat blanket. In the section the pieces of different sizes and shapes, without crushed bones and with inclusions of crushed spices. Soft consistency with light gray to brown color. The smell is

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characteristic of the assortment of meat dishes, pleasant, without foreign smell. The taste after heat treatment is characteristic of the type of product, without foreign taste and suitable for salting.

As a result of the organoleptic assessments of the chopped semi-finished products - Cighirii taken in the study, it can be mentioned that qualitative parameters related to the external appearance, cross-sectional appearance, smell, taste, consistency were recorded that fall within the permissible requirements of the normative acts in in force for this product category, HG 624/2020.

The study on the research theme related to the assessment of the quality and safety of the minced meat semi-finished products made for public consumption also includes the assessment of the physico-chemical indices that demonstrate concrete and specific values for each individual product category. Thus, the mass fraction of proteins, the mass fraction of fat and the mass fraction of sodium chloride were evaluated for semi-finished meat products - Cighiri (table 2).

Table 2

Physico-chemical indices of meat semi-finished products and chopped by-products - Cighiri

Indices	Normative requirements Government Decision (GD nr. 624/2020)	Obtained results		Normative Data for test methods
		,,semi-finished meat and chopped by-products - Cighiri" Sample - I (n=6)	,,semi-finished meat and chopped by-products - Cighiri" Sample - II (n=6)	
		$\overline{X} \pm S\overline{x}$	$\overline{X} \pm S\overline{x}$	
Mass fraction of sodium chloride, %	1,0-3,0	1,20± 0,010	1,23 ± 0,014	9957-73.p2
Protein mass fraction, %	5,0-9,0	17,75 ± 0,122	18,05± 0,135	SM SR ISO 937
Fat mass fraction, %	Max.35,0	23,90 ± 0,201	24,32 ± 0,240	SM SR ISO 1443:2012

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As a result of the laboratory investigations of the minced meat semi-finished products - Cighiri, Sample - I, an average value of the salt mass fraction of 1.2% was recorded, a result specific to the given product and which falls within the requirements of the normative acts in force HG 624/ 2020 for these products.

Regarding the mass fraction of fat for the semi-finished products studied - Cighiri, Sample - I determined an average value of 23.9%, an index that falls within the permissible limits of the normative acts in force for these products.

The mass fraction of proteins in our research for the assortment of shredded semi-finished products - Cighiri, Sample - I was on average 17.75%, a result that corresponds to the admissible requirements of the normative acts in force HG 624/2020 for this product category.

Regarding the laboratory results evaluated for Cighiri minced meat semi-finished products, Sample -II, it can be mentioned that for the mass fraction of sodium chloride, an average value of 1.23% was established, a characteristic index for the given product and which falls within the requirements of the normative acts in force for this product.

The mass fraction of protein for Cighiri, Sample - II presented an average value of 18.05%, a result that falls within the normative requirements in force for the given products.

Regarding the mass fraction of fat, the laboratory results showed an average value of 24.32%, a result that corresponds to the normative requirements in force for the products studied.

So, it should be noted that the physico-chemical indices evaluated for Cighiri minced meat semi-finished products, presented appreciable and compliant results for both samples taken in the study, in accordance with the normative acts in force for the given products.

Taking into account the fact that, due to its nutritional value, meat and meat products represent a favorable environment for the development of pathogenic microorganisms, and especially during storage, we evaluated the quality of the semi-finished products from the shredded meat taken in the study from a microbiological point of view.

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So, the quality of meat and meat products is directly influenced by the type and number of microorganisms that end up polluting the meat in the event of non-compliance with hygiene conditions during meat procurement, processing, handling and storage. The presence of pathogenic germs brings waste, economic inefficiency, limits the shelf life of the product, even takes it off the shelf and most importantly, endangers the health of the consumer.

The assessment of the microbiological indices of the minced meat semi-finished products taken in the study highlights the presence or absence of pathogenic germs such as: Coliform bacteria, Salmonella the presence of L. Monocytogenes germs, Esherichia coli beta-glucoronidase positive, the number of colonies at 30 °C, (table 3).

Table 3

Microbiological indices in meat semi-finished products and chopped by-products - Cighiri

Indices	**Regulatory requirements**	**Obtained results**		**Normative Data for test methods**
		,,semi-finished meat and chopped by-products - Cighiri" Sample - I (n=6)	**,,semi-finished meat and chopped by-products - Cighiri" Sample - II (n=6)**	
E. Coli betaglucoronidază pozitivă, ufc/g	m=500, M= 5000	< 10		SM SR ISO 16649-2:2011
Listeria monocytogenes, g	De facto	Not detected in 25 g		SM EN ISO 11290-1:2017
Bacterii coliforme,g	De facto	Not detected in 0,01g		SM ISO 4831:2010
Salmonella spp	It is not allowed	Not detected		SM EN ISO 6579-1:2017
Numărul de colonii la 30°C	De facto	$9,9x10^2$	$9,89x10^2$	SM EN ISO 4833-1:2014

The results presented in table 3, regarding the microbiological indices evaluated in semi-finished meat and

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chopped by-products - Cighiri, show us that in the samples taken in the study no pathogenic microorganisms were detected that would endanger the health of the consumer and the reputation of the economic agent.

Heavy metal pollution is a worldwide problem, they are found in different concentrations in soil, water, air, animal and plant foods, depending on the different factors that cause their pollution.

A source of heavy metal contamination of food can be contact with processing, packaging, storage machines, installations or equipment.

The result of the determination of toxic elements or heavy metals in minced meat semi-finished products - Cighiri are recorded in the following table.

Table 4

Toxic elements evaluated in semi-finished meat and shredded by-products - Cighiri

Indices	Regulatory requirements	Obtained results		Normative Data for test methods
		,,semi-finished meat and chopped by-products - Cighiri" Sample - I (n=6)	,,semi-finished meat and chopped by-products - Cighiri" Sample - II (n=6)	
Pb, lead, mg/kg max	0,1	< 0,02	< 0,02	SM SR EN 14082:2006 PS 7,2-L-R-01
Cd cadmium, mg/kg max	0,05	< 0,005	<0,005	

The harmlessness of meat products is a very important criterion, which in our research was represented by the content of Pb and Cd. From the data presented in the previous table, it can be mentioned that the semi-finished products from minced meat - Cighiri taken in the study from two domestic producers are harmless, complying with the requirements of GD no. 520/2010 and presented appreciable results not only for harmlessness indices but also for sensory, physico-chemical and microbiological ones. Results that are confirmed by the fact that the manufacturer strictly

complies with all the technical, technological and sanitary-hygienic requirements for the manufacture of semi-finished products from minced meat and subsequently made for public consumption.

CONCLUSIONS

1. The organoleptic characteristics studied in semi-finished meat and chopped by-products - Cighiri from two local producers in a refrigerated state, kept at a temperature of 0...+4 and relative air humidity of maximum 75%, demonstrated sensory quality indices, which correspond to the normative acts in force for these products expressing the external appearance, color, smell, taste, consistency, etc.,

2. The physico-chemical indices evaluated in the semi-finished products from minced meat - Cighiri, presented concrete values and corresponding to the samples of homemade Cighiri taken in the study. The mass fraction of salt, the mass fraction of protein, the mass fraction of fat determined, reflect to us an insignificant difference of 0.3% between Sample - I and Sample - II on the grounds that they come from two different manufacturers but both results are consistent and correspond the normative requirements in force HG 624/2020 for these products.

3. The microbiological parameters determined in the semi-finished meat products - Cighiri, taken in the study demonstrated results that tell us about the absence of pathogenic microorganisms and at the same time about the sanitation, compliance and safety of meat products made for public consumption.

4. The harmlessness of the minced meat semi-finished products - Cighiri taken in the study was assessed through the prism of the heavy metals lead (Pb) and cadmium (Cd), which demonstrated values that comply with the normative requirements in force HG 520/2010 being safe for public consumption.

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