

## Studies regarding the protein content of pork ham

Nicoleta-Simona Roșca<sup>1</sup>, Monica Negrea<sup>1\*</sup>, Petru-Bogdan Rădoi<sup>1</sup>, Diana Dogaru<sup>1</sup>

<sup>1</sup>Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania” from Timișoara, Faculty of Food Processing, 119, Calea Aradului, 300645, Timisoara, Romania

Received: 25 April 2017; Accepted: 17 May 2017

---

### Abstract

Aim of the present paper was to determine the protein content from two samples of ham, made by a private producer from the West Region of Romania, to strengthen the consumer confidence in food safety.

We obtained and analyzed two types of ham (Praga and Premier), during an experimental period of three years, 2013-2015, before implementing the HACCP system (2013) and after its implementation (2014-2015), in order to track the food quality, regarding the nutritional value.

**Keywords:** ham, protein content, food safety

---

### 1. Introduction

Pork ham belongs to the category of pasteurized meat specialties, being obtained from pork leg and brine, added with water, sugar, nitric salt, meat flavors and sodium tripolyphosphate. Analyzing the composition, pork leg contains heterogeneous unsaturated animal fats. From the list of ingredients follows that water and salt ranks 2 and 3 share in the composition of ham. [4]

The nutritional value of meat is high due to the high level of protein, vitamins and minerals. Proteins are basic components of food that provide nutritional value. So the quality of meat products could be appreciated according to their protein content. [2,3]

Meat by its proteins, is an important source of nitrogenous with high biological value. The biological value of meat protein is conditioned by the component in amino acids, in particular essential amino acids and their proportion. Evaluating the quality of meat proteins means to consider the digestibility and high biological value (~90%), meat proteins belonging to Class I of quality. [1]

Proteins represent the basic component of meat and meat products in terms of nutritional value.

The quality of these products is assessed primarily by their protein content. The protein content of foods can be determined using several methods, the reference method is the Kjeldahl method, which is based on determination of total nitrogen. Meat proteins have a nitrogen content with relatively constant value, 100 g protein contain about 16 g nitrogen. The classical method for determination of proteins is based on the principle of determining total nitrogen and its conversion in equivalent protein using corresponding multiplication factor including a coefficient of accepted error. This is because on the one side the conversion factor has conventional character, and on the other side it is expressed as protein and non-protein nitrogen contained in the product. The error can be somewhat larger at products in which the natural non-protein nitrogen is added and nitrogen coming from some adjuvants (nitrates, nitrites). [6]

### 2. Materials and method

**2.1. Materials:** we obtained and analyzed two types of ham (Praga and Premier), during three years of experimental, 2013-2015.

The receipt for Praga ham contains pork pulp and salt solution. The salt solution for Praga pork ham is

composed by sugar, ice and water, sodium ascorbate, nitrate salt, sodium tripolyphosphate. The Premier ham samples contain pork pulp and salt solution made from sugar, ice and water, sodium ascorbate, meat aroma, nitrate salt, sodium tripolyphosphate.

**Method:** Determinations were carried out according to the following standards:

SR ISO 937: 2007 - Meat and meat products. Determination of nitrogen content. [8]

SR ISO 17025/2005 - General requirements for the competence of laborator for testing and calibration. [7]

### 3.Results and Discussion

The manufacturing technology for Premier and Praga pressed ham followed the same recipe and manufacturing technology for all three experimental years (2013, 2014 și 2015). 2014 followed the implementation of the HACCP system in the product manufacturing process in order to increase food safety and nutritional properties.

The studied ham samples were analyzed physico-chemical quarterly during the period 2013-2015.

The results for the nutritional properties of the studied Praga ham samples were reported to admissibility conditions established by Romanian law.

The protein is an indicator of the nutritional value of meat products having particular importance in proper functioning of biological processes that occur in human nutrition. The studied samples of Premier ham recorded values of protein content between 11.04% and 12.01% (Figure 1).

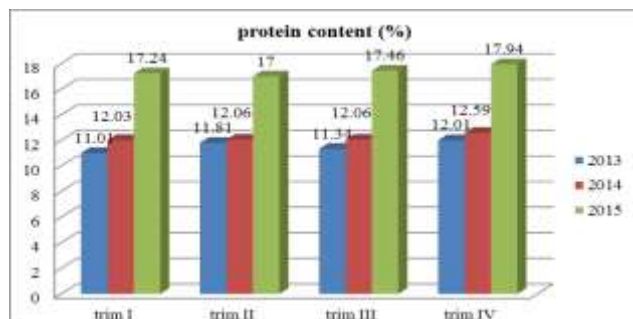


Figure 1. Protein content (%) of Premier ham samples studied between 2013 - 2015

The protein content established by Order 210/2006 concerning conditions of admissibility of physico-chemical properties for meat products is minimum 12%. [5]

Values of protein content in the samples studied in 2013 are lower than the admitted limit of 12%, in the first three quarters (11.01%; 11.81% and 11.34%), increasing in the fourth quarter at 12.01%.

Following the analysis carried out in 2014 in Premier ham samples, the values of protein content range between 12.03% (I. Quarter) and 12.59% (IV. Quarter), higher than in 2013.

The results for Premier ham samples in 2014 are in accordance with the minimum allowed limit of 12%, established by Order 210/2006. [5]

Following the analysis performed in 2015 for Premier ham samples, the values of protein content range between 13.4% (I. Quarter) and 14.72% (III. Quarter), higher than the minimum allowed limit of 12%. [5]

Values of protein content in Premier ham samples studied in 2015, are higher than values recorded in 2013 (11.04 - 12.01%) and in 2014 (12.03 - 12.59%).

In samples of Praga ham studied in 2013, the values of protein content are between 14.28% and 15.12% (Figure 2).

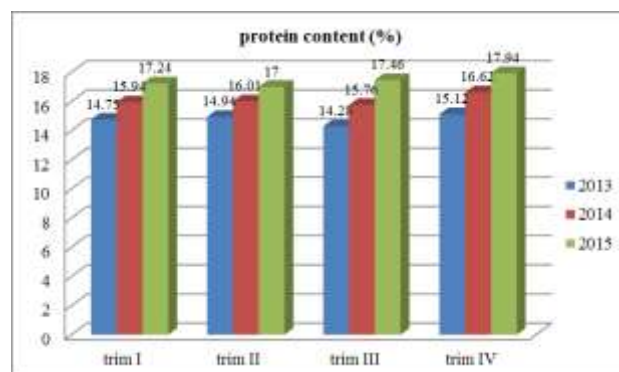


Figure 2. Protein content (%) of Praga ham samples studied between 2013 - 2015

The analysis during 2014 for the Praga ham samples recorded values of protein content between 15.76% and 16.62%, higher than values recorded in 2013 (14.28 - 15.12%).

In 2015, the Praga ham samples registered values of protein content between 17% and 17.94%, higher than values recorded in previous years, in 2014 (15.76-16.62%) and in 2013 (14.28 -15.12%).

The protein contents recorded in the three experimental years were in accordance with the values established by Order 210/2006 concerning admissibility conditions of physico-chemical properties of meat products, which set a minimal value of 12%. [5]

The implementation of HACCP system in the process leads to an improvement of nutritional values for the studied Premier ham samples.

#### 4. Conclusion

The values of protein content recorded in 2015, for the studied Premier ham samples, were higher (13.4 - 14.72%) than in 2013 (11.04 - 12.01%) and 2014 (12.03 - 12.59%), according to the minimum value of 12% legal established by Order 210/2006.

Following the analysis performed for protein content in 2015 on Praga ham samples, the values are between 17% and 17.94%, higher values than those recorded in previous years, 2014 (15.76-16.62%) and 2013 (14.28-15.12%), results in accordance with the legal values established by Order 210/2006 concerning conditions of admissibility of physicochemical properties of meat products of minimum 12%.

**Compliance with Ethics Requirements.** Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

#### Acknowledgements

We wish to thank the *Banat's University of Agriculture Sciences and Veterinary Medicine Timișoara, Faculty of Food Processing*, for a generous helpful of different kinds and support.

#### References

1. Banu, C.; Alexe, P.; Vizireanu, C., *Procesarea industrială a cărnii*, Editura Tehnică, București, **1997**
2. Cocan, I.; Velciov, A.; Negrea, M.; Stoin, D.; Dogaru, D., Study of main physicochemical characteristics of Polish chicken sausages, *Journal of Agroalimentary Processes and Technologies*, **2015**, 21(3), 290-292
3. Cocan, I.; Velciov, A.; Stoin, D.; Negrea, M., Research on the main sensory and physicochemical characteristics of chicken pastrami, *Journal of Agroalimentary Processes and Technologies*, **2015**, 21(4), 328-331
4. Mencinicopschi, G.; Cironeanu, I.; Neagu, M.M.A.; Pană, E.L., *Produse din carne românești*, Editura Altpress Tour, București, **2006**
5. <http://www.legex.ro/Ordin-210-2006-75963.aspx>. Ordinul nr. 210 din 30 august **2006** privind condițiile de admisibilitate ale proprietăților fizico-chimice ale produselor din carne de tip mezeluri
6. Purcărea, C., *Controlul și analiza cărnii și a preparatelor din carne, pește și produse piscicole, ouă și produse avicole. Îndrumător de laborator*, Editura Universității Oradea, **2015**
7. SR ISO 17025/**2005** – Cerințe generale pentru competența laboratoarelor de încercare și etalonare
8. SR ISO 937: **2007**- Carne și produse din carne. Determinarea conținutului de azot