

Physico-chemical characteristics of pork function of the state of fattening

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Abstract. The meat due to the chemical composition is a staple food in human nutrition. Physico-chemical characteristics and taste of the meat is influenced by many factors: the state of fattening animal species, nutrition, slaughtering, handling, packaging and storage. The fat in pork is influenced by the state of fattening as follows: fatty meat presents a fat content of 31.56%, the average meat 15.75% and lean meat 4.76%. The content of the highest protein substances can be found in lean meat, 19.88%.

Key Words: Pork, fat, protein substances, water.

Introduction. Of all animal products, meat is of particular importance in human diet, due to both high protein levels and because they present organoleptic qualities. In developed countries the consumption of animal protein per capita is higher than in developing countries (Ionescu et al 2009). The meat content of amino acid helps to maintain a normal nitrogen balance in organism. Proteins of meat, has an almost constant essential amino acids composition, except meat with a high content of connective tissue. Meat is the richest source of iron required by the organism. It also has a high content of B vitamins and vitamin PP (Vintilă 2008). Pork has a high mineral content, especially iron and zinc (Tomovic et al 2015). Organoleptic characteristics are important in assessing meat quality. The freshness is defined by: color, smell, texture, appearance, layout and appearance of bone marrow after boiling broth (Pop et al 2011). The meat color is influenced by the amount of hemoglobin remaining in the flesh, the ratio of muscle tissue and the fat, the ratio of reduced and oxidized pigments condition and freshness. Hemoglobin content into the meat affect color intensity, which is varying by race, age, sexes, state of fattening, various abnormal physical condition and heat the meat, chilled and frozen pH (Laslo et al 2008). Because of the chemical composition of pork has a higher energy value than other species (Rachiciu 2010). Chemical composition of the flesh varies by species, individual, animal fat cover, age of the animal, but also due to muscle tissue biochemical processes that take place after the slaughtering (Pop et al 2013; Bulancea & Râpeanu 2009). Breed and feed influence the chemical composition of pork and fat content of the carcass. These factors influence the quality of products obtained from pork (Suárez-Belloch et al 2016). Quality pork is influenced by the following factors: genetic background, nutrition, animal maintenance system, the way of slaughtering, processing and handling, seasonality (Tomovic et al 2015).

The purpose of this paper is to analyze the physical and chemical parameters of pork on the state of fattening.

Material and Method. The analyzed pork samples were collected from a meat processing unit in Cluj County. For the analysis of physical-chemical parameters of pork on the state of fattening, 30 samples of meat were collected (10 samples – FM [fat meat], 10 samples - AM [average meat] and 10 samples – LM [lean meat]); 15 samples of minced meat and packaged in three categories (5 samples - FM, 5 samples - AM and 5 samples - LM); 15 samples of pig carcasses of three categories (5 samples FM, 5 samples AM, 5 samples LM), and 15 samples of cutted pork (5 samples FM, 5 samples AM, 5

samples LM). Physico-chemical parameters were analyzed with Soxhlet. Easily hydrolysable nitrogen analysis was made using SR-9065/7/2007 (ASRO 2007a). Nessler reaction was determined by the method SR-9065/11/2007 (ASRO 2007b). H₂S reaction was determined as SR-9065/11/2007 (ASRO 2007b). Kreis reaction was determined according SR-9065/10/2007 (ASRO 2007c).

Results and Discussion

In terms of organoleptic characteristics, pork exhibited the following characteristics: meat with normal appearance, clean, non-sticky, pale pink, species and anatomy part specific, with white fat, firm and elastic consistency, no foreign smell. These characteristics are consistent with those shown in HGM 696/2010 Figure 1 illustrates the mean values for fat, protein substances and water content depending on pork fat cover.

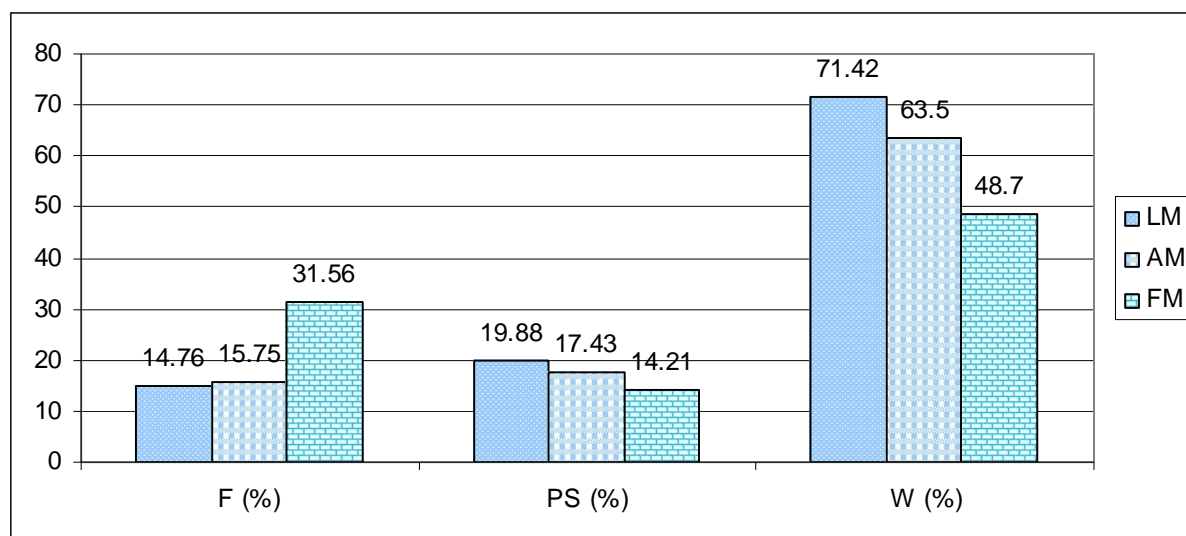


Figure 1. The content of fat, protein substances in pork and water depending on the state of fattening. F – Fat, PS% - protein substances, W% - water percent, FM – fat meat, AM - average meat, LM - lean meat.

The fat content of pork varies by state so fattening: F% in FM is 31.56%, 15.75% in AM and is the lowest in lean meat 14.76%. PS% in FM is the lowest 14.21%, followed by 17.43 in AM and is the highest in LM 19.88%. The water content varies as follows: 48.7% in FM, 63.5% in AM, and is the highest in LM, 71.42% (Figure 1). The data are in agreement with those reported by Cecilia et al (2012). Parameters analyzed in pork fat cover the corresponding legislations (HGM 696/2010). The values given by HGM 696/2010 for meat from adult pig depending on the state of fattening are: fat (49.1% water, 15.1% protein), medium (water 65.1%, protein 19.0%), lean (72.5% water protein, 20.1%).

Table 1
Average values and variability for easily-hydrolysable nitrogen in fat, medium and lean meat

Parameter	FM		AM		LM	
	X±sx	V%	X±sx	V%	X±sx	V%
NEH (mg/100 g)	16.52±0.13	2.42	16.39±0.07	1.44	16.47±0.08	1.54
Nessler reaction	negative		negative		negative	
H ₂ S reaction	negative		negative		negative	
Kreis reaction	negative		negative		negative	

NEH- Easily-hydrolysable nitrogen; FM – fat meat; AM - average meat; LM - lean meat; v% - variability.

In pig meat analysis the following values were obtained for samples regarding the easily hydrolysable nitrogen: the average value for FM was 16.52 ± 0.13 mg/100g, 16.39 ± 0.07 mg/100g for the AM, and 16.47 ± 0.08 mg/100g for LM. These values are within the limits set by the HGM 696/2010. The Nessler reaction, H₂S and Kreis, were negative in all samples analyzed (Table 1).

Minced pork and packaged meat. Samples were analyzed in terms of organoleptic characteristics and corresponded to the current legislation. The meat was packaged in casseroles, labeled and within the shelf life. At the package opening the content was a homogeneous paste with specific grist, soft consistency, with red color, specific to the added components. The product did not exhibit any foreign smell. Figure 2 illustrates the average values for fat, protein and easily-hydrolysable nitrogen for packaged and minced meat. Minced and packaged meat meets the veterinary requirements and is proper for commercialization. The test results correspond to EC Regulation 1162/2009 provisions.

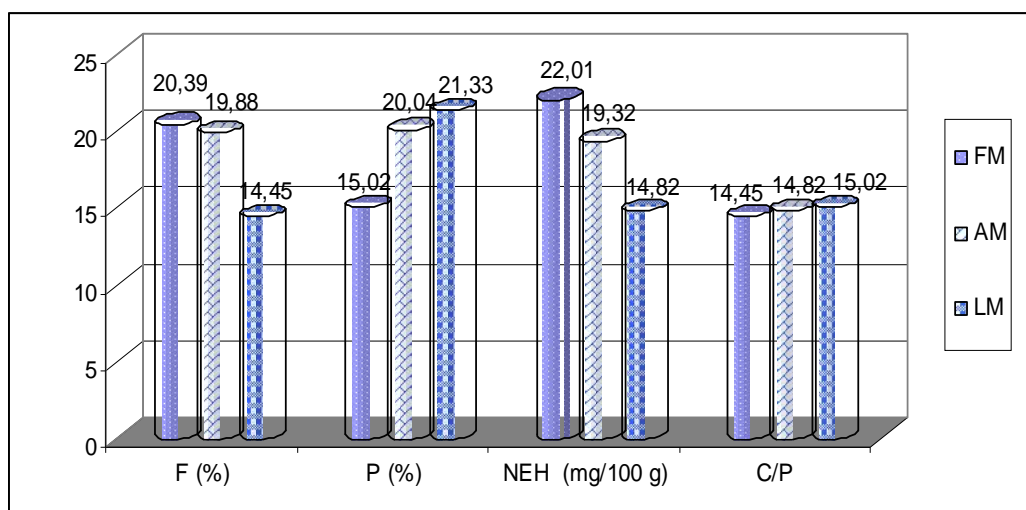


Figure 2. Physical and chemical parameters for minced pork casserole packed. FM – fat meat, AM - average meat, LM - lean meat. P – protein, NEH- easily-hydrolysable nitrogen, C/P - collagen/protein % of the total protein.

Pork cuts. In terms of organoleptic characteristics the pork cuts showed the following characteristics: presents a normal appearance, with clean non-sticky elastic consistency and firm white fat; color is pale pink; no foreign odor. The NEH for pork cuts is characterized by the following average values (mg/100 g): 16.15 ± 0.03 (FM), 15.88 ± 0.01 (AM) and 16.21 ± 0.05 (LM) (Figure 3).

The obtained average values for pork cuts are species and product characteristic with data within the legislation for these products (EC 1162/2009; HGM 696/2010). The NEH average values (mg/100 g) for pig carcasses are: the lowest 14.89 ± 0.03 in FM and the highest 15.36 ± 0.05 in LM from the analyzed samples.

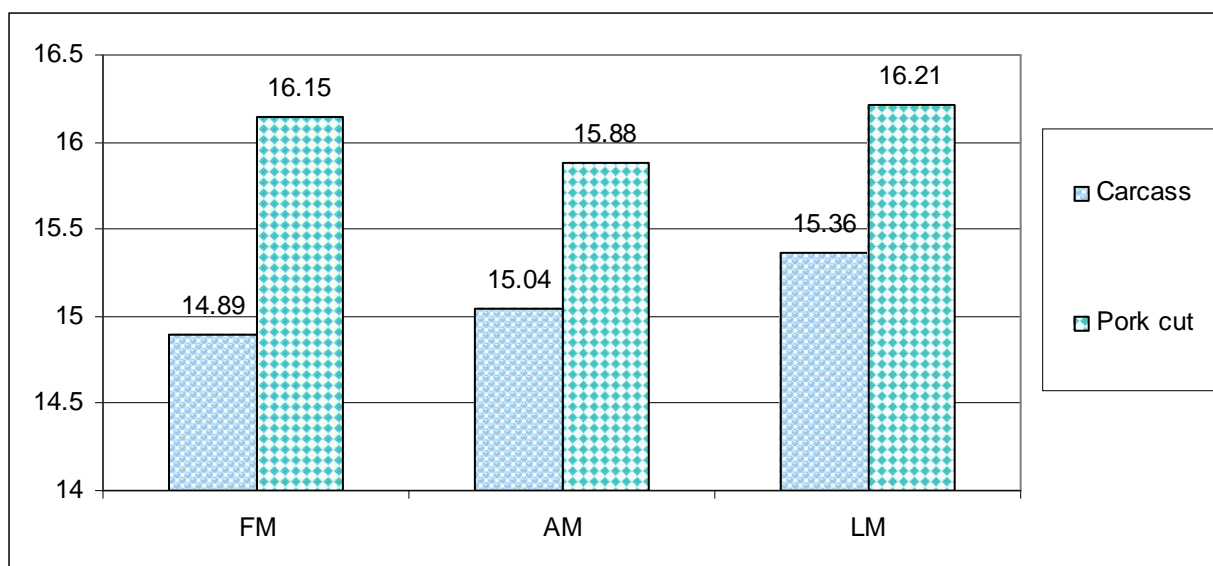


Figure 3. Mean values for easily-hydrolysable nitrogen in pork carcasses and pork cuts (mg/100 g).

Conclusions. Physico-chemical parameters analyzed in pork are depending on the state of fattening and comply with regulations (EC Regulation 1162/2009; HGM 696/2010. NEH average values (mg/100 g) are lower in the case of pork carcass compared to values of pork cuts.

References

- Balancea M., Râpeanu G., 2009 Autentificarea și identificarea falsificărilor produselor alimentare. Editura Didactică și Pedagogică, București.
- Suárez-Belloch J., Latorre M. A., Guada J. A., 2016 The effect of protein restriction during the growing period on carcass, meat and fat quality of heavy barrows and gilts. *Meat Sci* 112:16-23.
- Tomovic V., Jokanovic M., Sojic B., Skaljac S., Tasic T., Ikonc P., 2015 Minerals in pork meat and edible offal. *Procedia Food Sci* 5:293-295.
- Ionescu A., Aprodu I., Alexe P., 2009 Tehnologii generale – Tehnologie și control în industria cărnii. Available at: <https://motoareautoctie.wikispaces.com/file/view/TehnologiiGeneraleCarne.pdf>
- Laslo C., Stetca G., Suharoschi R., Muresan C., 2008 Controlul calității și igiena produselor alimentare de origine animală. Editura Risoprint Cluj-Napoca, Romania.
- Pop C., Mureșan G., Pop M., 2013 Calitatea, siguranța și merceologia produselor alimentare. Casa Cărții de Știință Publishing House, Cluj-Napoca, Romania.
- Pop C., Mureșan G., Pop M., Ștef D., 2011 Managementul calității produselor de origine animală. Casa Cărții de Știință Publishing House, Cluj-Napoca, Romania.
- Rachiciu C. D., 2010 Producerea și valorificarea cărnii de porc în exploatațile din vestul țării. PhD Thesis, USAMVBT, Timisoara, Romania.
- Vintilă C., 2008 Tehnologia prelucrării cărnii de calitate. Waldpress Publishing House, Timisoara, Romania, pp. 54-55.
- *** ASRO, 2007 Carne și preparate din carne. Azot hidrolizabil SR 9065-7:2007, România (Asociația de Standardizare din România).
- *** ASRO, 2007 Carne și preparate din carne. Reactia Nessler SR 9065/11/2007, România (Asociația de Standardizare din România).
- *** ASRO, 2007 Carne și preparate din carne. Reactia Kreiss SR 9065-10:2007, România (Asociația de Standardizare din România).

- *** EC 1162/2009 Regulamentul Comisiei Europene nr. CE 1162/2009 de stabilire a unor măsuri tranzitorii de aplicare a regulamentului CE nr. 853/2004, 854/2004, 882/2004 ale Parlamentului European și ale Consiliului.
- *** HGM 696, 2010 Hotărârea cu privire la aprobarea reglementărilor tehnice – Carne – materie primă. Producerea, importul și comercializare, Moldova.

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