

# RESEARCHES ON THE CHARACTERIZATION OF PHYSICAL AND CHEMICAL PARAMETERS OF REFRIGERATED MEAT FROM WILD BOAR SAMPLED FROM THE N-E PART OF ROMANIA

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## Abstract

Increased attractiveness for hunting sports related to media continues and intense coverage requires a scientific argument in terms of quality for the exclusivity of this source of protein. The specific features of game meat are a direct consequence of its morphological and physico-chemical peculiarities, which is in close correlation with the wild part of cohabitation. This work aims, is to analyze the data by the intrinsic value of wild boar meat, harvested by shooting in the N-E parts of Romania. Meat samples, collected from different muscle regions were subjected to determine the chemical composition (protein, fat, water, and collagen). Postharvest pH evolution of meat was determined at 2° C in refrigerated conditions of biological material. The physical and chemical studied parameters showed a higher nutritive-biological value (22,2% proteins in longissimus dorsi muscle) compared to the one obtained from domestic animals, related with a minimum content in total fat, fact that places this raw material as a value alternative protein in human nutrition.

**Key words:** wild boar, chemical composition of meat, pH, nutritive value

## INTRODUCTION

Today, meat quality is an issue for consumers, increasingly more concerned about the nutritive, biological, food and culinary side of this raw material, the ecological alternative protein sources being considered a necessity. All these issues depend on the chemical composition, therefore the content in protein, fat, water, collagen and their proportion [1, 2, 3, 5].

Although at global area the field of meat industrialization increased tremendously in terms of study methods for quality improvement of game meat, nationally, in literature there is a deficit of information for the characterization of game meat [4].

Therefore, this study aimed quality assessment of wild boar meat through physical and chemical parameters, starting from the premise of the superiority of game meat over the one of commercial pigs.

## MATERIAL AND METHODS

As biological material we used a total of 12 individuals, 6 male and 6 female of wild boar (*Sus scrofa ferus*), 3 and 4 years old. They were harvested by shooting from the N-E part of Romania. The eviscerated carcasses presented weights ranging between 50 and 80 kg for females ( $\bar{X}$  = 63.66 kg eviscerated carcass) respectively 65 and 108 kg corresponding to the boars ( $\bar{X}$  = 85.5 kg eviscerated carcass).

At 24 hours after harvest were taken samples from the middle of the following muscles: *longissimus dorsi* (LD), *semimembranosus* (SM), *intercostalis externus* (IC), and *gluteus medium* (GM).

The processing of muscle tissue samples was done with the Food-Check (Fig. 1) spectrophotometer, on muscle regions, in order to analyze the chemical composition. Thus, we followed the determination of protein, collagen, fat, water and pH. The pH value was measured with the electrode of HANNA INSTRUMENTS 98240 pH meter

(Fig. 2), practicing the successive immersion in a suspension consisting of distilled water and triturate of each piece studied (aqueous extract).

All physical and chemical determinations were made on chilled meat at 2°C.



Fig. 1  
Food – Check  
Meat automatic analyzer



Fig. 2 - HANNA  
INSTRUMENTS 98240  
pH oximeter

## RESULTS AND DISCUSSION

The biological protein value of meat is given by its composition in amino acids required for body, content in minerals, vitamins and bio-stimulators, increasing the nutritional value of this raw material.

Total protein content (Table 1) of the wild boars and sows carcasses reveal minimal variations, both between sexes and analyzed muscles. The variation of minimum values recorded at the studied individuals ranged from the lower limit of 18.3 % proper to IC muscles (♂) and the upper limit of 21.6% recorded in SM muscle (♀). For the maximum obtained values, there was a percentage of 22.2 % corresponding to the LD muscle (♀), in the case of this muscle group being registering the highest average of 21.81 % for protein. Collagen is the main

protein of the connective tissue from striated muscle, its elemental composition being according with the origin of the source. Its determination (Table 2) revealed a lower average content in IC muscles, females and males (18.76 % respectively 18.23 %), the highest average of 19.83 % being recorded in the LD muscle (♀).

In accordance with the presented parameter values was found and the average of water content (Table 3), ranging from 69.28 % in IC muscle (♂) and 75.36 % in LD muscle (♀). The maximum value of standard deviation (4.41), corresponding to the average of 75.6 % for IC muscle (♀), was followed by a difference of 0.26 % of 4.15 value, which corresponds to the average percentage of water (69.28 %) recorded in the same muscle group.

Table 1  
Total protein content of the wild boar carcass (*Sus scrofa ferus*) ♀ and ♂

PROTEIN (%)	Specification	Longissimus dorsi muscle		Semimembranosus muscle		<i>Intercostalis externus musclesc</i>		Gluteus medium muscled	
		♀	♂	♀	♂	♀	♂	♀	♂
	Minimum	21.5	21.2	21.6	21.4	18.7	18.3	21	20.7
Maximum	22.2	21.7	21.9	21.8	21.7	21.7	21.7	22.1	
Average ( $\bar{x}$ )	21.81	21.55	21.73	21.61	20.55	20.2	21.38	21.43	
Standard deviation (s)	0.24	0.18	0.10	0.16	1.21	1.32	0.29	0.47	
Variance ( $S^2$ )	0.06	0.03	0.01	0.02	1.41	1.76	0.08	0.22	
Variance coefficient (V %)	1.13	0.86	0.47	0.74	5.90	6.56	1.36	2.20	
<b>ANOVA</b>		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.	

Table 2  
Total collagen content of the wild boar carcass of (*Sus scrofa ferus*) ♀ and ♂

COLLAGEN (%)	Specification	Longissimus dorsi muscle		Semimembranosus muscle		<i>Intercostalis externus musclesc</i>		Gluteus medium muscled	
		♀	♂	♀	♂	♀	♂	♀	♂
	Minimum	19.1	19.6	18.5	19.2	16.9	16.3	19.2	19
Maxaximum	20.3	20.1	20.1	20	20.3	19.6	20	20.4	
Average ( $\bar{x}$ )	19.83	19.9	19.71	19.76	18.76	18.23	19.68	19.75	
Standard deviation (s)	0.41	0.16	0.62	0.31	1.26	1.29	0.33	0.51	
Variance ( $S^2$ )	0.17	0.028	0.38	0.09	1.60	1.68	0.11	0.263	
Variance coefficient (V %)	2.10	0.84	3.16	1.58	6.75	7.12	1.71	2.59	
<b>ANOVA</b>		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.	

**ANOVA** = the significance of differences between average parameter (analysis of variance),  
**N.S.** = insignificant differences,  $P \geq 0.05$ ; \* sau **s** = significant differences ( $\hat{F} > F_{\alpha, 0,05}$ ) \*\* sau **d.s.** = distinct significant differences ( $\hat{F} > F_{\alpha, 0,01}$ ); \*\*\* sau **f.s.** = very significant differences ( $\hat{F} > F_{\alpha, 0,001}$ )

Table 3  
Water content of the wild boar carcass (*Sus scrofa ferus*) ♀ and ♂

WATER (%)	Specification	Longissimus dorsi muscle		Semimembranosus muscle		<i>Intercostalis externus musclesc</i>		Gluteus medium muscled	
		♀	♂	♀	♂	♀	♂	♀	♂
	Min.	74.7	73.4	74.6	72.8	64.4	63.1	70.1	71.5
Max.	76.1	75.3	75.3	75.5	75.6	73.5	75	76.4	
Average ( $\bar{x}$ )	75.36	74.7	75.05	74.18	72.01	69.28	73.43	74.41	
Standard deviation (s)	0.58	0.67	0.31	1.002	4.41	4.15	1.87	1.76	
Variance ( $S^2$ )	0.346	0.45	0.09	1.005	19.52	17.25	3.51	3.09	
Variance coefficient (V%)	0.78	0.90	0.41	1.35	6.13	5.99	2.55	2.36	
<b>ANOVA</b>		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.	

The lipid content (Table 4) ranged from an average lower limit of 2.58 % corresponding LD muscle (♀) to a maximum of 7.25 % in the IC muscles (♀).

The pH value is a factor with direct influence on the technological properties of meat. These average values (Table 5), determined at 24 h post-mortem showed a

variation between  $5.56 \pm 0.05$  (♀) and  $5.58$   $0.22$  (♂) for LD muscle while the pH of SM muscle was 5.54 (♀ and ♂), standard deviations being 0.09 (♀) respectively 0.11 (♂). The mean values of the pH at 24 hours obtained in this study may be considered normal, as part of the parameters cited from the literature [1].

Table 4  
Total fat content of wild boar carcass (*Sus scrofa ferus*) ♀ and ♂

FAT (%)	Specification	Longissimus dorsi muscle		Semimembranosus muscle		<i>Intercostalis externus musclesc</i>		Gluteus medium muscled	
		♀	♂	♀	♂	♀	♂	♀	♂
	Minimum	1.8	2.8	2.4	1.7	2.3	4.2	3	1.4
Maximum	3.5	3.5	3.6	3.7	11.9	10.5	5.9	7.2	
Average ( $\bar{x}$ )	2.583	3.46	2.91	3.33	7.25	6.483	4.20	3.83	
Standard deviation (s)	0.725	0.79	0.39	1.19	3.99	2.325	1.11	2.02	
Variance ( $S^2$ )	0.52	0.63	0.15	1.41	15.97	5.405	1.24	4.10	
Variance coefficient (V %)	28.06	23.05	13.44	35.73	55.13	35.86	26.55	52.86	
<b>ANOVA</b>	♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.		♀ X ♂ = n.s.		

**ANOVA** = the significance of differences between average parameter (analysis of variance), **N.S.** = insignificant differences,  $P \geq 0.05$ ; \* sau **s** = significant differences ( $\hat{F} > F_{\alpha} 0,05$ ) \*\* sau **d.s.** = distinct significant differences ( $\hat{F} > F_{\alpha} 0,01$ ); \*\*\* sau **f.s.** = very significant differences ( $\hat{F} > F_{\alpha} 0,001$ )

Table 5  
The mean values of pH at 24 h post-mortem in longissimus dorsi and semimembranosus muscles of wild boars carcass (*Sus scrofa ferus*) ♀ and ♂

Specification	Longissimus dorsi muscle		Semimembranosus	
	♀	♂	♀	♂
n	6	6	6	6
Minimum	5.49	5.3	5.43	5.33
Maximum	5.65	5.96	5.68	5.59
Average ( $\bar{x}$ )	5.563	5.58	5.546	5.546
Standard deviation (s)	0.0578	0.2242	0.0993	0.110
Variance ( $S^2$ )	0.0033	0.0502	0.0986	0.012
Variance coefficient (V %)	1.0398	4.0184	1.7908	1.9837
<b>ANOVA</b>	♀ X ♂ = n.s.		♀ X ♂ = n.s.	

**n** = number of individuals

Although in the case of the determinations done were noted differences between the chemical composition of studied muscles, they were insignificant ( $P > 0.05$ ), probably reflecting the performance of growth and the period at which the

harvesting was done (period of rut) with direct influence on the behaviour and level of nutrition.

## CONCLUSIONS

1. This study highlights the particular chemical composition of wild boar meat and its pH at 24 hours post-mortem, the studied parameters highlighting the nutritive and biological properties for the game meat which is considered an optimum material for food diversification.
2. The ratio between the analyzed parameters has reflected an increase value in terms of nutritional, biological and food of the LD muscle, sampled from carcasses of females, this being found in the current preferences of consumers.
3. For the differences in the chemical composition should be considered the harvesting period during of studied specimens, when males are mating, fact demonstrated by the different obtained results of the chemical composition of meat between sexes.

## REFERENCES

### *Journal article:*

- [1] Andreá Fernanda Marchiori, P. E. de Felicio,: Quality of the boar meat and commercial pork, *Scienta Agricola*, 2003, v. 60., 1: 1-5.
- [2] Müller E., Moser G., bartenschlager H., Geldermann H.: Traits values of growth carcass and meat quality in Wild boar, Meishan and Pietrain pigs as well as their crossbred generations, *J. Anim. Breed. Genet.*, 2000, 117: 189-202.
- [3] Razmaitė Violeta, Kerzienė Sigita, Jatkauskienė Virginija, Nainiene Rasa,: Consumption qualitz of cold smoked meat of male hybrids from Lithuanian indigenous wattle pig with wild boars intercross, *Medycyna Wet.*, 2008, 64 (4A): 414-416.
- [4] Tudor L., Mitrănescu Elena, Furnaris F.: The dynamical values of some physic-chemical indicators in refrigerated wild boar meat, XII<sup>th</sup> International Congress on Animal Hygiene, 2005, v. 2: 534-537, Warsaw, Poland.
- [5] Zmijewski T., Korzeniowski W.: Technological properties of wild boars, *Electronic Journal of Polish Agricultural Universities*, 2001, 4(2).