RESEARCH REGARDING NUTRITIONAL CHARACTERIZATION OF HORSE MEAT

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Abstract

In the context of polemics existing in Romania, starting from mass – media to specialised scientific profile, it is very difficult to affirm that one of the healthiest red meats is the horse meat.

Having a low content of fat, rich in iron and containing omega 3 and 7 fatty acids, as some experts argue, the use of horse meat currently in the food industry creates controversy. The aim of this paper is to characterize the chemical composition of horse meat, on three muscle tissues, respectively, Longissimus dorsi, Semitendinosus and Deltoideus and harvested from a total of 10 horses slaughtered in a slaughterhouse in our country. The research was performed both males and females, the results being conclusive for this stage of work. This study brings valuable information regarding the nutritional value of horse meat, results that give us the possibility to compare this with other species that are slaughtered, such as cattle, pig.

Key words: chemical composition, nutritional value, horse meat

INTRODUCTION

The decision to prefer a certain type of meat just keep culinary culture of each consumer. Due to its nutritional quality, horse meat may substitute anytime any other red meat in food, with one condition, namely respect for traceability on the technological slaughter flow.

Retracing the route of the slaughtered animal, the consumer can always check the conditions in which the horses were bred, the quality of food given to them.

Tateo, De Palo, Ceci, & Centoducati (2008) mentioned in their study that the chain of slaughtering horses in Europe is still not standardized because of some considerations: low consumption / per capita / year excluding intensive countries (Italy, Belgium, France, Spain); import a large number of horses from Eastern Europe, but not for rearing and fattening in order to obtain meat fit for consumption, but for sport and recreation, and due to unforeseen accidents or reaching the end of their careers, to be illegally slaughtered.

Franco et al. (2013) notes that consumers are now more aware in terms of health, so prefer eating meat with a lower fat content, in category that enters the horse meat also.

MATERIAL AND METHODS

Raw chemical composition was determined by automatic analyzer Food – Check (Fig. 1), working method corresponding standard textbook for use of the spectrophotometer. Thus, based on spectrophotometry (NIR) have been rendered the values of percentage of protein, lipid, collagen, and the amount of water in muscle samples collected from slaughtered horses within the unit.

Figure 1 Automatic analyser Food check

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Because the technique is fast, accurate, infrared spectrophotometry has been used successfully in the meat industry. *(Mitsumoto et al. 1991.; Hildrum et al. 1995)*

Samples analyzed are represented by 3 types of muscle (*Longissimus dorsi*, *Deltoideus and Semitendinosus*) collected from a total of 10 horses (5 females and 5 males), randomly selected from the technological to slaughter. They helped us to establish differences between muscle composition and also to render the the nutritional value of horses carcasses.

To determine differences between horses carcasses selected on the basis of sex, statistical analyzes were performed by applying the Fisher test Anova package. The results showed that gender influences the amount of water, fat, meat protein and collagen.

RESULTS AND DISCUSSIONS

The work is part of an extensive study of the description of quality indicators horse meat slaughtered in our country. Therefore, characterization of nutritionally meat from this species is required in order to comply and comparison with other types of meat consumed.

Meat quality is the sum of all nutritional factors, sensory, hygienic and technological process characteristics.

The results of measurements performed on the three muscle groups showed that animals gender has significant influence on the chemical composition of the meat (Tab. 1).

Table 1 Statistical estimators for the amount of water in the meat horses depending on their gender

Specification		Gender	n	Statistical estimators calculated				The significance of differences between means lots (FISHER TEST)
				$\bar{X}\pm s_{\bar{X}}$	V%	Min.	Max.	
Water (%)	L.D	F	5	74.08±0.06	0.20	73.9	74.3	$\hat{F}_{18.21} > F_{0.01\%}(11.26)$ $\rightarrow **$
		M		73.3±0.17	0.51	72.9	73.9	
	S	F		74.22±0.05	0.17	74.1	74.4	$\hat{F}_{24.06} > F_{0.01\%}(11.26)$ $\rightarrow **$
		M		73.84±0.05	0.15	73.7	74	
	D	F		74.26±0.05	0.15	74.1	74.4	$\hat{F}_{13.06} > F_{0.01\%}(11.26)$ $\rightarrow **$
		M		73.98±0.05	0.17	73.8	74.1	

D=*Longissimus dorsi*; S=*Semitendinosus*; D=*Deltoideus;* F=female; M=male

Regarding the water content of the three groups of muscle tissue have resulted significant differences between the sexes, the maximum being recorded by muscle *Deltoideus* females (74.26 ± 0.05%.) and the lowest average being represented *Longissimus dorsi* by males (73.3 ± 0.17%).

Table 2 Statistical estimators for the lipids in the meat horses depending on their gender

Specification		Gender	n	Statistical estimators calculated				The significance of differences between means lots (FISHER TEST)
				$\bar{X}\pm s_{\bar{X}}$	V%	Min.	Max.	
Fat (%)	L.D	F	5	3.9±0.03	1.81	3.8	4	$\hat{F}_{6.0} < F_{0.01\%}(11.26)$ $\rightarrow *$
		M		4.02±0.03	2.08	3.9	4.1	
	S	F		3.82±0.03	2.19	3.7	3.9	$\hat{F}_{9.14} < F_{0.01\%}(11.26)$ $\rightarrow *$
		M		3.98±0.05	2.87	3.9	4.1	
	D	F		3.86±0.02	1.41	3.8	3.9	$\hat{F}_{10.12} < F_{0.01\%}(11.26)$ $\rightarrow *$
		M		4.04±0.05	2.82	3.9	4.2	

L.D=*Longissimus dorsi*; S=*Semitendinosus*; D=*Deltoideus;* F=female; M=male

Male muscle tissue reflected a high amount of fat to females, a difference also found by A. Tateo et al. (2008) average for males being 4.52% and 4.01% in females.

This difference is mainly due to food administered to horses. The main source of horse nutrition is represented by the cereal starch and cellulose compounds, and are sugars or carbohydrates, lipids and fat contained in the feed, or other plant products, so the amount of fat recovered in horses is higher to those who are fed hay. The share of fat tissue increases with age.

Table 3 Statistical estimators for the proteins in the meat horses depending on their gender

Specification		Gender	n	Statistical indicators calculated				Significance differnces between means lots (FISHER TEST)
				$\overline{X} \pm s_{\overline{X}}$	V%	Min.	Max.	
Proteins (%)	L.D	F	5	20.8±0.24	2.58	19.9	21	$\hat{F}_{10.40} < F_{0.01\%}(11.26) \rightarrow *$
		M		21.76±0.17	1.79	21.3	22.2	
	S	F		20.64±0.17	1.89	20	21	$\hat{F}_{9.33} < F_{0.01\%}(11.26) \rightarrow *$
		M		21.26±0.10	1.08	20.9	21.5	
	D	F		20.84±0.27	2.98	20.3	21.3	$\hat{F}_{9.90} < F_{0.01\%}(11.26) \rightarrow *$
		M		21.82±0.13	1.42	21.9	22.1	

L.D=*Longissimus dorsi*; S=*Semitendinosus*; D=*Deltoideus;* F=female; M=male

Significant differences exist if the percentage of protein derived from muscle tissue of males than that of females, males with a maximum of 21.82 ± 0.13 and 20.84 ± 0.27 for females. Comparing with the data retrieved by Sarriés and Beriain (2005) where the males average 20.59 ± 1.29 protein is and the females 20.50 ± 1.55 we can mention that the results are similar to other researchers in the field.

Table 4 Statistical estimators for the colagen in the meat horses depending on their gender

Specification		Gender	n	Statistical indicators calculated				Significant differences between means lots (FISHER TEST)
				$\overline{X} \pm s_{\overline{X}}$	V%	Min.	Max.	
Collagen (%)	L.D	F	5	19.82±0.06	0.74	19.6	20	$\hat{F}_{6.54} < F_{0.01\%}(11.26) \rightarrow *$
		M		19.58±0.06	0.75	19.4	19.8	
	S	F		20.1±0.39	4.40	19	21.1	$\hat{F}_{8.88} < F_{0.01\%}(11.26) \rightarrow *$
		M		18.9±0.07	0.83	18.7	19.1	
	D	F		19.74±0.34	3.86	18.9	20.9	$\hat{F}_{9.51} < F_{0.01\%}(11.26) \rightarrow *$
		M		18.26±0.33	4.12	17	19	

L.D=*Longissimus dorsi*; S=*Semitendinosus*; D=*Deltoideus;* F=female; M=male

The quantity of collagen is higher in females than in males, the minimum is found in muscle *Deltoideus* of males taken in study (18.26 ± 0.33%), and the maximum is represented by *M. Semitendinosus* of females (20.1 ± 0.39%).

José M. Lorenzo and Mirian Pateiro (2012) considers that the nutritional characteristics that fullfills it, horse meat can substitute any other red meat being considered a "dietetic" meat.

CONCLUSIONS

From the data obtained after measurements that were made and performed statistical calculation, we consider meat from horses as suitable for consumption requirements, falling from a nutritional standpoint in the same category as that of cattle slaughtered in specialized units, at national and internationally level.

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