RESEARCH ON ASSESSMENT OF SENSORY HORSE MEAT SLAUGHTERED IN NE REGION

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Abstract

Compounds which contribute to the taste and flavour of meat interact in a complex way thus influencing its perception in the moment of consumption. Inherent flavour of meat and meat products may be influenced by oxidation, lipid content, myoglobin, pH variations. Also, numerous research shows that animal feed influences the meat flavour of animals subjected to slaughter. Because of the close relationship between flavour and palatability of meat is very important that people, livestock producers and manufacturers to understand very well the factors that influence this feature.

To achieve sensory evaluation of horse meat were studied four groups (youth and adults ♂ or ♀ youth and adult) collected from the Longissimus dorsi muscle. The samples were prepared in the form of cubes with a side of 3 cm, which were then subjected to baking. The meat was tasted in a room with lights aimed not to mask obvious color differences.

Analyzing the sensory qualities of the horse meat, the smell of broth perceived by tasters was stronger in lot L3 with an average of 9.14 ± 0.91 and minimal odor intensity was recorded at lot L1 with an average of 6.20 ± 0 95.

Key words: flavour, horse, taste

INTRODUCTION

Many of the flavour characteristics are destroyed by improper meat storage and also through its cooking. It is known that the degree of lipids oxidation in meat depends on the composition of the phospholipids, the amount of polyunsaturated fatty acids and the concentration of metal ions, oxygen. As a result of this oxidation are formed aldehydes, hydrocarbons, furans and ketones which provide meat flavors such as a rancid taste.

Thus, the oxidation can be controlled to supplement the antioxidant substances in the muscle tissue. This is achieved by feeding the animal with grains, due to increased levels of vitamin A, C, E, carotenoids, flavonoids. [3]

The meat pH plays an important role in the development of flavour from the Maillard reaction. As the pH increases, polymeric substances, in color, and the nitrogen-containing increase. As the fresh meat has a pH of 5.5 ÷ 6.0, with a good buffering capacity, research shows that an increase in pH is a decrease in the perceived flavour intensity of meat.

With the increase of pH increase also the properties of the protein to bind water, so during the preparation of food are lost a large amount of water-soluble proteins, so smaller weight losses. [1]

The main components that develops flavor are protein, carbohydrates and fats they containing various compounds that are able to develop flavor precursors important in thermal treatment. [2]

The flavour of horse meat is influenced by a number of factors among which the most important are diet changes post-mortem that occur in the animal tissues, since they are the precursors of the protein compounds, fatty acids which are essential in the formation of organoleptic properties including aroma.

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MATERIAL AND METHOD

The samples sensorial analyzed were represented by *Longissimus dorsi* muscle, samples were collected at 24 what hours after slaughtering. After collection, the samples were frozen at - 20 °C, and for tasting these were thawed at 4 °C a period of 24 hours.

Baking the samples, which have been previously prepared in the form of cubes with a side of 3 cm, it was performed in an electric oven preheated to 120 °C for 20 minutes. This time is necessary to achieve the temperature of 75°C in the center of each sample, temperature monitored by a thermocouple type K.

At the end of the cooking stage, the samples were identified, numbered and served warm to the tasters. Sensory evaluation was conducted in a test sensorial chamber with lights designed not to mask the obvious color differences.

RESULTS AND DISCUSSIONS

For evaluating descriptive sensorial parameters the samples considered were from the *M. Longissimus dorsi*, collected from the four experimental lots studied, samples having undergone baking, to characterize all descriptive sensorial parameters.

Subjective appreciation of analysed lots was performed using a questionnaire that provided a rating scale from 1÷100 completed by the tasters, then these data have been processed as indicators and statistical significance in Table 1 and Table 2.

Table 1 Descriptive sensory parameters estimators at M. Longissimus dorsi, by age and sex

Specification		Lot exp.	$\bar{X} \pm s_{\bar{x}}$	V%	Min. – Max.	Differences interpretation T-Test (2-tailed)	
TEXTURE	IJ	L1	50.46±2.20	13.82	40.97 – 60.24	L1-L2	t = -0.61; p = 0.556$^{ns.}$
		L2	52.03±1.83	11.11	42.50 – 60.58	L1-L3	t = -2.53; p = 0.032*
		L3	56.30±1.55	8.70	50.36 – 64.19	L2-L4	t = -1.59; p = 0.146$^{ns.}$
		L4	57.03±13.3	13.39	44.57 – 65.89	L3-L4	t = -0.20; p = 0.846$^{ns.}$
	PJ	L1	31.85±1.77	17.61	20.56 – 40.25	L1-L2	t = -0.40; p = 0.697$^{ns.}$
		L2	33.51±2.81	26.57	21.23 – 50.24	L1-L3	t = - 0.78; p = 0.456$^{ns.}$
		L3	35.61±3.59	31.88	20.42 – 50.44	L2-L4	t = -0.95; p = 0.367$^{ns.}$
		L4	38.39±3.69	30.41	20.48 – 60.27	L3-L4	t = -0.45; p = 0.666$^{ns.}$
	H	L1	39.15±2.80	22.57	30.98 – 53.21	L1-L2	t = -0.92; p = 0.383$^{ns.}$
		L2	41.78±3.32	25.12	25.48 – 56.78	L1-L3	t = -3.21; p = 0.011*
		L3	51.22±3.44	21.22	35.68 – 64.37	L2-L4	t = -5.10; p = 0.001***
		L4	56.61±2.32	12.93	45.28 – 67.58	L3-L4	t = -1.22; p = 0.252$^{ns.}$
	C	L1	45.03±1.88	13.21	34.56 – 52.37	L1-L2	t = -1.09; p = 0.306$^{ns.}$
		L2	47.34±2.35	15.71	34.21 – 57.29	L1-L3	t = -7.98; p = 0.000***
		L3	60.50±2.30	12.03	50.22 – 70.24	L2-L4	t = -6.25; p = 0.000***
		L4	64.28±2.68	13.17	50.34 – 74.30	L3-L4	t = -1.01; p = 0.338$^{ns.}$
	F	L1	25.97±1.75	21.27	20.12 - 35.24	L1-L2	t = -3.27; p = 0.01**
		L2	33.42±2.95	27.90	21.27 – 50.24	L1-L3	t = -3.86; p = 0.004**
		L3	43.98±3.78	27.22	25.68 – 60.21	L2-L4	t = -7.26; p = 0.000***
		L4	58.41±2.20	11.92	48.68 – 71.24	L3-L4	t = -3.99; p = 0.003**

L1=youth ♀; **L2**=youth ♂; **L3**=♀ adult; **L4**=♂ aduts

T- test (2 tailed) – for each character examined of the muscle texture profile compared on the experimental groups: $^{ns.}$ insignificant differences (p> 0.05); * Significant differences (p <0.05); ** distinct significant differences (p <0.01); *** very significant differences (p <0.001).

Thus for the original lots juiciness analyzed were not significant differences, except made by L1-L3 lots which has significant difference. The variation coefficient, V> 10%, causes lack of homogeneity of lots, but L3 lot recorded a value of 8.7% which may be an acceptable homogeneity of the lot.

Determining averages of horse meat juiciness values obtained were between 50.46 ± 2.20 at young females to 57.03 ± 13.39 in adult males.

The persistence of juiciness, analyzed parameter in the sensory evaluation, recorded minimum averages values between 31.85 ± 1.77 in young females and maximum of 38.39 ± 3.69 in male adults. Interpretation of statistical data demonstrated that using values obtained are significant differences between the sexes also different age or betweenthe sane sex and age. The coefficient of variation V confirmed by statistical calculation that analyzed lots were not homogeneous, coefficient V recording a value > 15%.

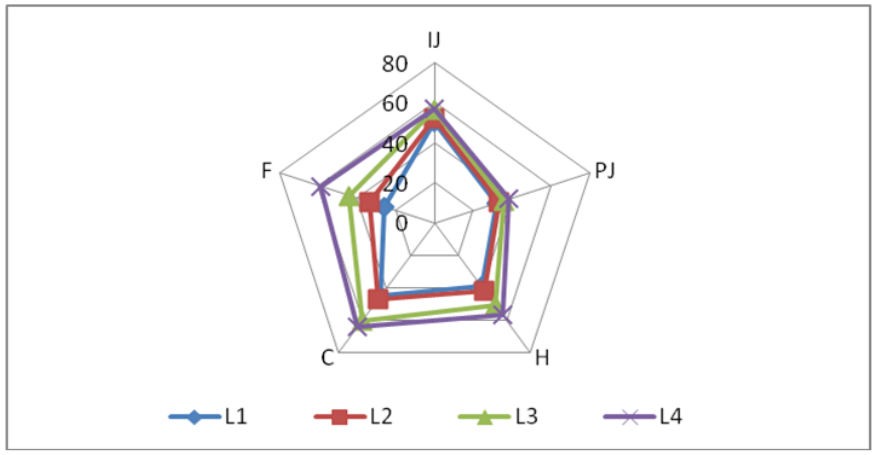
Hardness, analyzed parameter for *M. Longissimus dorsi* showed very significant differences for lots analyzed L2-L4 and significant differences for lots L1-L3 for the remaining lots the differences were not significant. These differences arise because horse age at slaughter and activity throughout the life cycle.

Averages for parameter studies have ranged between 39.15 ± 2.80 (the young females) and the 56.61 ± 2.32 (adult males). Coefficients of variation ranged between 12.93 ÷ 25.12 %, explaining the homogeneity weakness of lots.

Chewability, of analyzed lots present values between 45.03 ± 1.88, 64.28 ± 2.68 ÷, minimal at young females and maximum at adult males. The coefficient of variation for calculated lots caused more than 10%, explaining inhomogeneity of horse lots.

Statistical results obtained indicate significant differences in the lots of young females and the adult females (L1-L3) and between young males and adult males (L2-L4), statistical differences in the other two groups were classified as insignificant.

For parameter fibrousness were found distict significant differences between lotss L1 - L3, L1 - L3 and L3 - L4 and very significant differences in lots L2 - L4 values obtained due to muscle fiber types and activities pre slaughtering.



IJ = initial juiciness; PJ = persistence of juiciness; H = hardness; C = chewability; F = fibrousness; L1 – young females; L2 – young males; L3 – adult females; L4 – adult males

Figure 1 The average values of texture parameters for horse meat

Analyzing the sensory qualities of the horse meat, the smell of broth perceived by tasters was stronger in lot L3 with an average of 9.14 ± 0.91 and minimal odor intensity was recorded at L1 6.20 ± 0 95. Following significant statistical calculation values were found only for lots L1-L3. The variation coefficient has values above 15% indicating a very poor homogeneity of the lot.

The sweet smell, expressed by subjected muscles tests revealed significant differences between all groups analyzed statistically. Lots uniformity is not present given that the coefficient of variation was under V> 15% and recorded averages ranged from 34.59 ± 2.31 minimum to young females and 42.19 ± 2.97 maximum adult females.

Table 2 Descriptive sensory parameters estimators at M. Longissimus dorsi, by age and sex

Specification		Lot exp.	$\bar{X} \pm s_{\bar{x}}$	V%	Min. – Max.	Differences interpretation T-Test (2-tailed)	
FLAVOUR	SB	L1	6.20±0.95	48.59	2.58 – 10.48	L1-L2	t = -0.38; p = 0.716$^{ns.}$
		L2	6.62±0.89	42.71	2.47 – 10.44	L1-L3	t = -2.96; p = 0.016*
		L3	9.14±0.91	31.39	5.26 – 14.57	L2-L4	t = -2.02; p = 0.075$^{ns.}$
		L4	8.95±0.79	27.93	5.48 – 12.88	L3-L4	t = 0.223; p = 0.828$^{ns.}$
	SS	L1	34.59±2.31	21.16	25.41 – 45.63	L1-L2	t = -0.55; p = 0.603$^{ns.}$
		L2	36.10±3.06	26.77	22.31 – 50.24	L1-L3	t = -1.67; p = 0.130$^{ns.}$
		L3	42.19±2.97	22.28	29.27 – 55.43	L2-L4	t = -1.16; p = 0.274$^{ns.}$
		L4	41.36±2.42	18.47	30.21 – 50.21	L3-L4	t = 0.20; p = 0.846$^{ns.}$
	SM	L1	10.24±0.57	17.55	7.45 – 12.41	L1-L2	t = 0.75; p = 0.474$^{ns.}$
		L2	9.55±0.71	23.36	6.02 – 12.41	L1-L3	t = 3.99; p = 0.003**
		L3	7.82±0.68	27.34	5.04 – 11.20	L2-L4	t = 2.44; p = 0.037*
		L4	7.59±0.48	20.07	6.03 – 10.25	L3-L4	t = 0.26; p = 0.801$^{ns.}$
	SH	L1	26.82±2.03	23.87	15.44 – 35.63	L1-L2	t = -1.63; p = 0.139$^{ns.}$
		L2	30.25±2.08	21.75	20.36 – 38.92	L1-L3	t = -3.60; p = 0.006**
		L3	35.96±2.00	17.56	26.75 – 4658	L2-L4	t = -2.33; p = 0.045*
		L4	40.75±2.99	23.23	26.58 – 54.32	L3-L4	t = -1.56; p = 0.153$^{ns.}$
	SL	L1	4.98±0.38	24.35	3.24 – 6.74	L1-L2	t = 1.86; p = 0.097$^{ns.}$
		L2	4.10±0.34	26.33	2.68 – 5.67	L1-L3	t = 1.52; p = 0.162$^{ns.}$
		L3	4.17±0.27	20.83	3.21 – 6.21	L2-L4	t = 1.17; p = 0.274$^{ns.}$
		L4	3.44±0.33	30.75	2.06 – 5.24	L3-L4	t = 1.75; p = 0.115$^{ns.}$
	AT	L1	10.81±0.83	24.24	7.54 – 14.78	L1-L2	t = -1.48; p = 0.172$^{ns.}$
		L2	11.80±0.62	16.71	9.33 – 15.59	L1-L3	t = -1.56; p = 0.154$^{ns.}$
		L3	12.70±0.80	19.62	9.22 – 16.24	L2-L4	t = 0.90; p = 0.393$^{ns.}$
		L4	11.00±0.55	15.72	9.24 – 14.62	L3-L4	t = 1.67; p = 0.130$^{ns.}$
	MT	L1	34.51±1.90	17.37	24.39 – 44.12	L1-L2	t = -1.26; p = 0.238$^{ns.}$
		L2	36.50±2.12	18.36	25.12 – 45.61	L1-L3	t = -1.50; p = 0.168$^{ns.}$
		L3	40.14±2.28	17.98	30.27 – 50.32	L2-L4	t = -1.46; p = 0.179$^{ns.}$
		L4	42.50±2.87	21.39	33.33 – 55.67	L3-L4	t = -0.64; p = 0.536$^{ns.}$
	FC	L1	33.88±1.39	12.95	28.74 – 41.28	L1-L2	t = 0.47; p = 0.652$^{ns.}$
		L2	32.55±2.09	20.32	22.51 – 42.71	L1-L3	t = -1.41; p = 0.193$^{ns.}$
		L3	39.62±3.17	25.32	29.38 – 57.84	L2-L4	t = -1.67; p = 0.129$^{ns.}$
		L4	37.40±2.95	24.92	24.28 – 55.41	L3-L4	t = 0.74; p = 0.479$^{ns.}$
	PT	L1	35.64±2.53	22.48	24.57 – 50.37	L1-L2	t = 0.36; p = 0.726$^{ns.}$
		L2	34.17±2.48	22.97	24.71 – 48.27	L1-L3	t = -2.37; p = 0.042*
		L3	43.07±2.97	21.80	33.14 – 60.21	L2-L4	t = -1.89; p = 0.091$^{ns.}$
		L4	43.47±3.22	23.43	27.69 – 55.62	L3-L4	t = -0.11; p = 0.915$^{ns.}$

SB = the smell of broth**; SS =** sweet smell; **SM** = smell of milk**; SB =** smell of beef; **SL** = smell liver**; AT =** acid taste; **MT** = metallic taste / blood; **FC** = the fat coating in the mouth; **PT** = persistent taste; **L1**= youth ♀; **L2**= youth ♂; **L3**=♀ adults; **L4**=♂ adults.

T- test (2 tailed) – for each character examined of the muscle texture profile compared on the experimental groups: $^{ns.}$ insignificant differences (p> 0.05); * Significant differences (p <0.05); ** distinct significant differences (p <0.01); *** very significant differences (p <0.001)

The smell of milk, parameter studied for meat lots sampled, registered minimum value in the lots L4 - 7.59 ± 0.48 and maximum L1 - 10.24 ± 0.57. Determination of the coefficient of variation that is more than 15% concluded the lots heterogeneity for character analysis. Statistical results indicated distinctly significant differences between L1-L3 lots and significant at lots L2-L4.

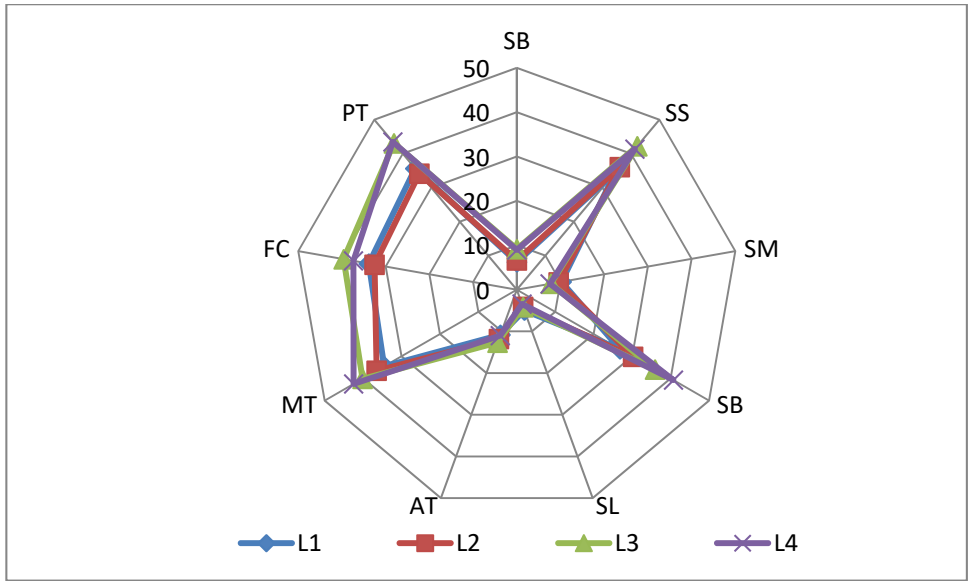
Distinctly significant differences were found for the smell of horse between groups L1 - L3, this feature mainly due to the age, the environment and animal feed during their lifetime and significant differences between L2-L4.

Statistical results calculations regarding the parameters analyzed, the smell of the liver, resulting insignificant differences for all examined lots depending on the studied character.

Acid taste, metallic taste / blood and fat coating the oral cavity showed values over 15% of the coefficient of variation values that inform us about the lack of homogeneity of the lots depending on the character analysis.

Interpretation of statistical data and calculating T test reveals information that for male and female lots of horses, young or adult the character imposed are insignificant. The analysed parameter of the persistent taste just presented significant value to L1-L3 lots comparison, while the coefficient of variation is greater than 15% and homogeneity of the lot is missing.

In figure 2 are graphically represented the descriptive parameters of taste and the smell of horse meat which gives its flavour.



SB = the smell of broth**; SS =** sweet smell; **SM** = smell of milk**; SB =** smell of horse; **SL** = smell liver**; AT =** acid taste; **MT** = metallic taste / blood; **FC** = the fat coating in the mouth; **PT** = persistent taste; **L1**= youth ♀; **L2**= youth ♂; **L3**=♀ adults; **L4**=♂ adults.

Figura 2 The average values for horse meat flavour parameters

CONCLUSIONS

Through overall analysis of textural parameters that allow assessment of higher sensorial values, we can conclude that the lots from horse young females have hardness, chewing and fibrosis less than that of adult animals either sex, and other characters analyzed can not be similarities between some parameters included the lack of homogeneity of the lots described by the coefficient of variation.

Statistical results determined from sensorial analysis suggests that gender and age in slaughtering horses have little effect on the sensorial characteristics of horse meat as perceived by the tasters members.

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