

CHEMICAL COMPOSITION AND QUALITY CHARACTERISTICS OF PORK IN SELECTED MUSCLES

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Bucko, O. - Petrák, J. - Vavrišínová, K. - Haščík, P. - Debreceni, O.
Slovak Agricultural University Nitra, Tr. A. Hlinku 2, Slovak Republic



INTRODUCTION

It has been the interest in increasing the proportion of lean meat and reduced fat in the carcass in recent years. This requirement, however, often comes into conflict with the right quality of meat. Intramuscular fat (inside the muscles) is important for assessing technology, culinary and sensory quality of pork. Nowadays, consumers require ever higher quality of pork. Current consumer judge the quality of meat is usually based on its sensory properties such as taste, aroma, juiciness and tenderness. Experts assess the quality of meat and other quality indicators, particularly on the pH, which is the most practical method for the determination of meat quality deviations. Also it is evaluated the meat color, water holding capacity and electrical conductivity of the meat.

OBJECTIVES

The objective of the experiment was to compare the differences in the parameters of chemical composition and physical quality of pork between selected muscles of pigs.

MATERIAL AND METHODS

The experiment included 28 pieces of Large White pig breeds, balanced gender, 14 barrows and 14 gilts. For all subjects, we analyzed the DNA marker gene RYR 1 in cooperation with the Department of Genetics and Breeding Biology and all individuals have the genotype NN as dominant homozygote without occurrence of free mutant allele n. Fattening and slaughtering is carried out in Laboratory of Experimental Center of the Department of Animal husbandry. During the fattening pigs were all fed by the same feed mixtures, depending on the growth curve. The average slaughter weight was 104 kg. The parameters of the chemical composition of pork and physical quality, we describe in three selected muscles, the adductor, musculus semimembranosus and musculus longissimus thoracis in carcass of barrows and gilts. Chemical composition of pig meat was determined by FT IR Nicolet 6700 analyzer in g/100g samples, meat color values in L*, a*, b* CM 2600 by spectrophotometer with D. The actual acidity, we found by pH-meter Sentron Titan X pH meter, electrical conductivity we investigated by the device Tecpro-quality meter in mS/cm.

RESULTS

In assessing the overall indicator of water content (g/100g), we found the highest value in MA muscle (musculus adductor) 75.42 g/100g, while the lowest value was measured in the MSM muscle (musculus semimembranosus) 72.85 g/100g. The value found in MLT muscle (musculus longissimus thoracis) 74.10 g/100g is the range between the values of the muscle has a MSM. The evaluation indicator of total protein (g/100g) in our experiment, we measured the value of MA muscle (m.adductor) 22.66 g/100g compared with MSM muscle (musculus semimembranosus) 21.16 g/100g and also compared with muscles MLT (musculus longissimus thoracis) 23.53 g/100g. The indicator of intramuscular fat (g/100g), we found the highest value of MSM in the muscle (musculus semimembranosus) 5.03 g/100g, while the values measured in MA muscle (m. adductor) and 1.53 g/100g MLT in the muscle (musculus longissimus thoracis) 1.76 g/100g showed similar results among themselves. The lowest measured value of the energy value of the indicator (KJ/100g) was detected in MA muscle (adductor) 451.14 KJ/100g. MSM muscle (musculus semimembranosus) amounted to 568.73 KJ/100g, while MLT muscle (musculus longissimus thoracis) equals 475.84 KJ/100g. The evaluation of pH1 indicator, we found the highest value in MA muscle (m. adductor) 6.15, while the lowest value was measured in the MSM muscle (musculus semimembranosus) 6.12. The value found in MLT muscle (musculus longissimus thoracis) 6.14 is the range between the values of the muscle has a MSM. The indicator EV1 (mS/cm), we found the highest value in the MSM muscle (musculus semimembranosus) 7.08 mS/cm, the values measured in MA muscle (m. adductor), 4.34 mS/cm and MLT in the muscle (musculus longissimus thoracis) 3.85 mS/cm between them showed similar results. In our work we found and measured color values L* MA in muscle (adductor) 40.37, MLT in the muscle (musculus longissimus thoracis) slightly higher at 57.90 and MSM muscle (musculus semimembranosus) was the highest value of 61.43.

The mean square of two-factor analysis of variance of composition and pork quality

Traits		Muscle F _A = 2	Sex F _B = 1	Interaction F _{AB} = 2	error f _e = 78	Significant
Total water (g/100g)	MS	46,104	5,841	0,464	1,521	MA:MLT ⁺⁺⁺ MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	30,304 ⁺⁺⁺	3,839 ⁺	0,305		
Protein (g/100g)	MS	39,931	2,037	1,523	0,825	MA:MLT ⁺⁺⁺ MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	48,395 ⁺⁺⁺	2,468	1,846		
Intramuscular fat (g/100g)	MS	107,130	9,785	2,911	2,115	MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	50,645 ⁺⁺⁺	4,626	1,376		
Energy value (KJ/100g)	MS	107 645,758	7 995,198	2 446,034	2 924,110	MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	36,813 ⁺⁺⁺	2,734	0,837		
pH ₁	MS	0,006	0,047	0,002	0,025	
	F	0,235	1,859	0,075		
pH ₂₄	MS	39,931	2,037	1,523	0,825	
	F	48,395 ⁺⁺⁺	2,468	1,846		
EV ₁	MS	84,654	0,583	1,626	4,390	MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	19,285 ⁺⁺⁺	0,133	0,370		
EV ₂₄	MS	249,945	3,987	0,317	3,651	MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	68,459 ⁺⁺⁺	1,092	0,087		
L*	MS	3 382,706	8,379	18,562	17,774	MA:MLT ⁺⁺⁺ MA:MSM ⁺⁺⁺ MLT:MSM ⁺⁺⁺
	F	190,316	0,471	1,044		
a*	MS	107,130	9,785	2,911	2,115	MA:MLT ⁺⁺⁺ MA:MSM ⁺⁺⁺
	F	50,645 ⁺⁺⁺	4,626 ⁺	1,376		
b*	MS	107 645,758	7 995,198	2 446,034	2 924,110	MA:MLT ⁺⁺⁺ MA:MSM ⁺⁺⁺
	F	36,813 ⁺⁺⁺	2,734	0,837		

The single statistic of chemical composition and pork quality of selected muscle

muscle	Musculus adductor			Musculus semimembranosus			Musculus longissimus thoracis et lumborum (mlt)			
	barrows (n=14)	gilts (n=14)	Total (n=28)	barrows (n=14)	gilts (n=14)	Total (n=28)	barrows (n=14)	gilts (n=14)	Total (n=28)	
Total water (g/100g)	\bar{x}	22,59	22,72	22,66	20,74	21,58	21,16	23,55	23,50	23,53
	s	1,02	0,73	0,88	1,23	1,03	1,19	0,71	0,54	0,62
Protein (g/100g)	\bar{x}	457,75	444,53	451,14	589,00	548,46	568,73	478,22	473,45	475,84
	s	17,79	25,41	22,55	89,34	90,10	90,43	16,22	14,85	15,45
Intramuscular fat (g/100g)	\bar{x}	1,67	1,40	1,53	5,74	4,32	5,03	1,93	1,58	1,76
	s	0,90	0,59	0,76	2,49	2,20	2,42	0,56	0,43	0,53
Energy value (KJ/100g)	\bar{x}	75,30	75,54	75,42	72,48	73,23	72,85	73,81	74,40	74,10
	s	1,12	1,19	1,14	1,79	1,53	1,67	0,81	0,54	0,74
pH ₁ - log molec. (H ⁺) v MLT	\bar{x}	6,16	6,13	6,15	6,15	6,09	6,12	6,16	6,12	6,14
	s	0,12	0,20	0,16	0,15	0,21	0,18	0,08	0,15	0,12
pH ₂₄ - log molec. (H ⁺) v MLT	\bar{x}	5,73	5,71	5,72	5,71	5,72	5,71	5,69	5,68	5,69
	s	0,06	0,06	0,06	0,07	0,07	0,07	0,07	0,06	0,06
E. conductivity ₁ - ms/cm v MLT	\bar{x}	4,24	4,44	4,34	7,44	6,72	7,08	3,84	3,86	3,85
	s	1,02	0,74	0,88	3,46	3,54	3,45	0,35	0,35	0,34
E. conductivity ₂₄ - ms/cm v MLT	\bar{x}	5,50	5,71	5,60	10,46	10,94	10,70	5,14	5,76	5,45
	s	1,09	2,05	1,61	2,67	1,44	2,12	1,74	2,08	1,91
Colour (24 hours) CIE L*	\bar{x}	41,85	39,89	40,87	61,99	60,87	61,43	57,31	58,49	57,90
	s	4,08	4,94	4,55	4,15	4,32	4,19	3,15	4,45	3,83
CIE a*	\bar{x}	9,17	9,43	9,30	1,29	0,38	0,84	-0,02	0,08	0,03
	s	1,33	2,16	1,77	1,80	1,60	1,73	1,01	1,39	1,20
CIE b*	\bar{x}	9,41	8,03	8,72	11,20	10,74	10,97	11,33	11,39	11,36
	s	1,99	1,82	2,00	1,63	1,17	1,41	0,98	1,38	1,17

CONCLUSION

Finally, we note that the highest total water content was found in the musculus adductor compared to musculus semimembranosus where we measured the lowest value of the monitored parameter. The proportion of intramuscular fat was highest in the musculus semimembranosus significantly lower values were measured in musculus adductor and MLT. The amount of total protein was found the highest in musculus lumborum et thoracis longissimus compared with a significantly lower value observed in the musculus semimembranosus. The physical indicators of pork quality parameters we measured pH and EV 45 at least 24 hours post mortem revealed significant differences between the monitored muscles to suggest an altered quality of meat. The indicator CIA meat color L*, a*, b* color parameter was in elementary couple which expresses L* lightness of meat found significant differences particularly between musculus adductor which we consider much dark muscle compared to the musculus semimembranosus, which we consider much light.