EFFECT OF ORGANIC ZINC OF PORK QUALITY, CHEMICAL COMPOSITION AND FATTY ACID PROFILE OF *MUSCULUS LONGISSIMUS THORACIS* IN LARGE WHITE BREED

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Abstract

The aim of the experiment was the analysis of the characteristics of the chemical composition of pork, determination of the parameters of physical and technological quality and profile of fatty acid of pork when using diet supplemented with organic zinc in *musculus longissimus thoracis*. The experiment was introduced in experimental centre of Department of Animal Husbandry of Slovak University of Agriculture in Nitra. There were 35 hybrid Large White Breed pigs used in this experiment. The animals were divided into the control group of 16 pigs and experimental group of 19 pigs. The control group was fed standard diet consisting of three feed rations applied in various growth phases - OŠ3 from 30 to 45 kg, OŠ4 from 45 to 70 kg, OŠ5 from 70 to 100 kg. The experimental group was fed the same feed mixtures in the same growth phases as control group and mineral-protein dough used for experimental group was enriched by zinc chelate of amino acid hydrate, which was 66 $mg.kg^{-1}$. Based on two-factor analysis of variance we can state the following results. We found very highly significant differences at $P \leq 0.001$ in 6 indicators of technological quality of pork: Content of zinc [$mg.kg^{-1}$], pH_{24} [log.molc (H^+)] ,total protein [%], total water [%], polyunsaturated fatty acids and monounsaturated fatty [$g.100g^{-1}$ FAME]. There were found highly significant differences at $P \leq 0.01$ in 4 parameters of quality of pork in this experiment : pH_1[log.molc (H^+)] , CIE L* after 24 hours [$g.100g^{-1}$] , CIE b* after 7 days [$g.100g^{-1}$]. We found significant differences at $P \leq 0.05$ in the indicators electrical conductivity [mS/cm^{-1}] and CIE b* after 24 hours [$g.100g^{-1}$] . In other monitored indicators of pork quality wasn't confirmed statistical significance of the differences between the experimental and control group.

Key Words: Zinc chelate, pork quality, Large White Breed, chemical composition, fatty acid profile

The aim of our the experiment was the analysis of the characteristics of the chemical composition of pork, determination of the parameters of physical and technological quality and profile of fatty acid of pork when using diet supplemented with organic zinc in *musculus longissimus thoracis*. The results of the study LI et al. (2007) indicated that the administration of zinc in pigs before slaughter increased pH , increased water holding capacity and improves the oxidative stability of pork. REKIEL et al .(2005) in their work noted that the addition of zinc oxide to the ration of pigs resulted a decrease saturated fatty acids and an increase polyunsaturated fatty acids and monounsaturated fatty acids. Although several authors as HILL et al. (2001) , HEO et at. (2010) , MAVROMICHALIS et al. (2001) confirmed the positive effect of zinc on feed intake but positive effect on the indicators of quality of pork was not confirmed. Contrary to the results of these authors are results in experiment by LIU et al . (2005) who confirmed that the addition of zinc had an impact on CIE b * and there was also a demonstrable increase in pH in *musculus longissimus thoracis* , reduction of shear force , reduction of drip loss and an increase intramuscular fat. Positive effect of zinc on the pH of the supplementation of the ration of pigs confirmed also RAMSEY et al. (1995). RAMSEY et al. (1995) supplemented ration by group of organic minerals, including zinc. The results showed that the experimental group had a statistically significant higher value of pH_1 suggesting a decrease in the risk of PSE meat which is characterized by low pH values. On the other hand, SALÁKOVÁ et al. (2011) found no effect of zinc on the indicators pH_1, shear force and drip loss.

Material and Methods

Animal and sample preparations

The experiment was introduced in experimental centre of Department of Animal Husbandry of Slovak University of Agriculture in Nitra. There were 35 Large White Breed pigs used in this experiment. The RYR-1 genotype of these animals was determined by a DNA test (Malignant hyperthermia syndrome, MH) while all experimental animals meet NN genotype. The swines were divided into the control group of 16 pigs (11 barrows and 5 gilts) and experimental group of 19 pigs (10 barrows and 9 gilts). The control group was fed standard diet consisting of three feed rations applied in various growth phases - OŠ3 from 30 to 45 kg, OŠ4 from 45 to 70 kg, OŠ5 from 70 to 100 kg. The experimental group was fed the same feed mixtures (Tab. I) in the same growth phases as control group and mineral-protein dough used for experimental group was enriched by zinc chelate of amino acid hydrate, which was 66 mg/kg^{-1} (optimin-zinc 15% LL101711). All feed was realized from 30 to 100 kg live weight. The growth potential was monitored by weighing of pigs with 0,5 kg accurate. The weightings were carried out at two week intervals in period from 30-90 kg and at weekly intervals in periods to 30 kg and from 90 to 100 kg live weight of pigs. The weight was statistically evaluated concurrently with the age of animals in days. The date of detection age of animals and respective weight had to be consistent. Slaughter and dissection carcasses of pigs was realized at slaughterhouse experimental center of livestock close to department of animal husbandry. Pigs were slauhtered with an average live weight of 102,5kg.

Dissection of carcass was performed according to the methodology STN 466164. The samples for the analysis of the chemical indicators were taken from thigh *musculus longissimus thoracis* during dissection of the right half/ carcase hold in storage for 24 hours *post mortem* at the temperature 3-4 ^{o}C. The sample from the muscle 100 g *musculus longissimus thoracis* was taken 23 cm from the centre and it was hold in storage separately for 14 days at the temperature -19±0,5^{o}C before the analysis was carried out.

Analysis of chemical indicators of *musculus longissimus thoracis*

The indicators of chemical composition and composition of intramuscular fat of the pork in *musculus longissimus thoracis* of Large White Breed were measured on the muscular homogenate sample (50g) by the FT IR method using the device Nicolet 6700. The total proteins in %, the intramuscular fat in % total water in % and fatty acid profile in intramuscular fat in g.100g^{-1} FAME were analyzed. The analysis of infra-red spectrum of the muscular homogenate was carried out by the method of molecular spectroscopy. The principle of this method is the absorption of the infra-red spectrum during the sample transition where there is a change of the rotary vibrating energetic conditions of the molecule depending on the changes of the dipole momentum molecule. The analytical output is the infra-red spectrum which is a graphic representation of the function dependence of the energy, mostly given in transmittance percentage (T) or absorbance units (A) on wave-length of the incident emission. The transmittance is defined as a ratio of the intensity of the emission which has passed the sample (I) and the intensity of the emission emitted by the source (Io). The absorbance is defined as a decimal logarithm 1/T. The dependence of the energy on the wave-length is logarithmic, so a number of waves - defined as a reciprocal of the wave-length – is used therefore the presented dependence of the energy on the number of waves is linear function. Calibration standards of fatty acid were evaluated from the muscular homogenate from *musculus longissimus thoracis* (50g) by the gas chromatography (GC) method at the laboratory of Institute of Chemistry, Faculty of Natural Science, Comenius University in Bratislava.

Chemicals and other material

Pyridine, Chlorophorm, Methanol, N-hexane, 0,5 M Sodium Methanolate in Methanol, Methyl Acetate, Oxalic Acid in Ether (1g/30ml), Sodium Chloride, Guard column-Supelco, Discovery Ag-Ion 6ml tube (USA), Microsyringes (50, 100µl) – Hamilton (Bonaduz AG, Switzerland), Pipette (2ml) – Agilent Technologies (USA), Vials (2, 4, 12 ml) – Agilent Technologies (USA), Helium 4,6 (content 99,996% N2 <20, Ne <10, SO2 <5, CO <1 µl/l) – Tatragas (Bratislava, Slovakia), Hydrogen (electrolytic) – Tatragas (Bratislava, Slovakia), Air – compressed.

Gadgets and apparatuses

Gas chromatograph with FID and MS detectors - GC – Agilent Technologies 6890 N, Network GC System (USA), – MS – Agilent Technologies 5973 Network GC System (USA), Analytical Scales – Explorer Pre, model EP 114C (Switzerland), Laboratory centrifuge– Sigma, model Laboratory centrifuge 2-6, (Germany), Platform Shaker – Heidolph, Model Rotomax 120 (Germany).

Preparation of the fatty acid methyl esters

At first 4 – 5 g of tissue was isolated from muscle and was homogenized by grinding. 1g sample was taken from this homogenized mixture. We used 4ml of chlorophorm:methanol mixture (2:1) in order to extract the sample and it was shaken for 1 hour. After extraction we added 2 ml of salt solution (0,9% solution NaCl) to the sample and it was shaken again for 10 minutes. The sample was allowed to stand and then we took the bottom layer, approximately 2 ml, and we put it to laboratory centrifuge. From this adjusted sample we took 1ml for transesterification.

Fractionation of the fatty acid methyl esters using Ag-Ion SPE method

Discovery Ag-Ion SPE tubes were developed for the fraction of methyl esters according to degree of saturation of fatty acids. Procedure according to Kramer: 1) Condition: 4 ml 100% acetone, 4 ml n-hexane, 2) sample load (1mg methyl esters in 1ml n-hexane), 3) Elution 6 ml mixture hexane:acetone (99:1), extract: saturated FAME, 4) Elution 6 ml mixture hexane:acetone (96:4), extract: mono-trans FAMEs plus t/t FAME isomer CLA, 5) Elution 6 ml mixture hexane:acetone (90:10), extract: mono-cis FAMEs plus c/t FAME isomer CLA, 6) Elution 6 ml mixture hexane:acetone (0:100), extract: dienes FAME, 7) Elution 6 ml mixture 3% acetonitrile in acetone, extract: all of the trienes FAME, 8) Elution 6 ml mixture 6% acetonitrile in acetone, extract: all of the tetraens FAME, 9) all fractions need to be evaporated under the N2 sparge. After centrifugation and transesterification of the sample, the whole volume of liquid fraction without coagulum was removed and it was put into 2ml vial and it was dehydrated at temperature 60°C. After dehydration the sample was dissolved in 1 ml of dehydrated n-hexane. Ag-Ion tube was activated before usage by 4 ml acetone and after that 4 ml dehydrated n-hexane in order to remove moisture. The 1 ml sample (content TAG 1mg) was loaded on this tube. After overflow, the tube was washed by 6 ml 1% acetone in hexane solution. Hexane eluate (approximately 7 ml volume) created 1st fraction, that comprised saturated fatty acids (linear as well as branched). Then the tube was washed by 6 ml 100% acetone and we acquired fraction of all of the unsaturated fatty acids. After refractionation of several samples of methyl ester fatty acids mixture, the Ag-Ion tube must have been activated and washed by 6 ml 100% acetone and after that 6 ml dehydrated n-hexane. acquired eluates were dehydrated at temperature 55°C. The sample for analysis was acquired by dissolution of vapors in 1 ml n-hexane, it means on volume of previous sample after trans esterification.

GC analysis

Gas chromatograph with MS detector was used for gas-chromatographic analysis. The most important gas that we used was helium with flow 1,1 ml/min. The conditions for fatty acid identification: Injector Split/Splitless Splitless: 1 min. Injector temperature: 280°C . Volumetric graduation volume: 1µl. Temperature at the beginning: 50°C Temperature gradient:0,5°C/min Temperature at the end:280°C Beginning MS: 50 min Colone: SPB-1 100m x 0,25mm x 0,25µm Ions chosen for identification in SIM mode: 74, 75,87, 101, 115, 125, 129, 139, 143, 149, 153, 157, 163, 167, 185, 191, 199, 213, 214, 227, 229, 241, 255, 269.

Physical indicators of quality

Physical indicators of meat quality were determined in laboratory of Experimental center at Department of Animal Husbandry at Slovak Agricultural University in Nitra. The color of meat was determined on *musculus longissimus thoracis* cross-section in place after last thoracic vertebra across the muscle fibres 24 hours *post mortem* by spectrophotometer CM-2600d. In order to measure meat color we determined color space CIE L*a*b*. The first characteristic brightness is represented by elementary color pair L* with scale values from 0 (black) to 100 (white). The second characteristic is represented by elementary color pair a* and it represents red/green sensation with scale values from +60 (red) do -60 (green). The third characteristic is represented by elementary color pair b* and it represents yellow/blue sensation with scale values from +60 (yellow) do -60 (blue). We measured the sample with a wet surface so we had to take into account also gloss (SCI - Specular Component Included). Actual acidity of muscle - log molc./ H+/ - pH was determined 45 minutes and 24 hours post mortem in *musculus longissimus thoracis* in place after last thoracic vertebra across the muscle fibres by microcapillary combination electrode. We also used barrier portable acidometer Sentron -Titan. Drip loss was determined in % and it was in accordance with HONIKEL methodology (1998) whereby we used 50 g of *musculus longissimus thoracis* in time period from 24 hours to 48 hours after pig slaughter. Muscle was stored in special plastic bags in a refrigerator at temperature 4-6°C. Shear force of *musculus longissimus thoracis* was determined by Warner-Bratzler gadget. After 7 days of storage at temperature 4 +/-1 C, the samples of meat were warmed at temperature 71 +/- 1 C during 30 minutes. Then the sample was adjusted for cuboid 1x1 cm cut across the fibres. Shear force was determined by gadget Chatillon.

DNA analysis RYR1

DNA was isolated by salting method MILLER et al . (1988) optimized for the conditions of the laboratory of the Department of Genetics and Breeding Biology. DNA samples were frozen till the beginning of the analyses. The isolated DNA was used for PCR-RFLP analysis of the RYR1 gene. We used following oligonucleotide primers FOR and REV that were adapted from Kaminski et al., (2002) for the amplification of the specific sections of the RYR1. The primer FOR 5´ - CTGGGA CATCATCCTTCTGG - 3´ and the primer REV 5´- GGGTTCTAAGCTCTGGGGTC - 3´. The reaction compound for PCR with total capacity of 25 µl contained: 1,5 µl x 10 reactive solution, 25 mM $MgCl_2$, 10 mM dNTP compound, 10pmol/µl of the primers FOR a REV, 5 U/µl Taq DNA polymerase (Fermentas) and 50 ng/ µl DNA. We conduced polymerase chain reaction with the using thermal cycler MJ Mini (Biorad) with the following thermal and time mode: denaturation 95 °C/3 min, hybridization 56° C /20 seconds, polymerization 72 °C/30 seconds and the number of cycles was 30. The acquired PCR product in size 272 bp was consequently cleaved by restriction enzyme FastDigest Hin6 I (Fermentas) at temperature 37 ° C and time period 5 minutes. Visualization of products PCR-RFLP was realized electrophoretically in 2% agarose gel with addition of intercalating dye GelRed (Biotium) with the using UV transillumitor.

Statistical evaluation

Data from *in vivo* experiment were analyzed using two-way analysis of variance with fixed factors (control group, experimental group with zinc chelate). For control and experimental group were determined basic statistical variation characteristics. For comparison differences between groups we used two-way analysis of variance (Two way ANOVA) in pursuance of statistical software package SAS ® version 9.1 (SAS Institute Inc, Cary, NC, 2004). The significance of differences was determined by F-test with a significance level of $P < 0.05$ and $P < 0.01$.

Table 1. Composition of the diet

Trait	Control (n=16)			Group organic zinc (n=19)		
	OŠ-3	OŠ-4	OŠ-5	OŠ-3	OŠ-4	OŠ-5
Barley %	26,5	26,0	26,0	26,5	26,0	26,0
Wheat %	26,0	24,4	26,0	26,0	24,4	26,0
Corn %	17,7	26,3	27,0	17,7	26,3	27,0
Soybean meal %	26,5	20,0	15,2	26,5	20,0	15,2
Wheat bran %	0,0	0,0	3,0	0,0	0,0	3,0
Mineral and protein supplement %	3,0	3,0	2,8	3,0	3,0	2,8
Fodder acid %	0,3	0,3	0,0	0,3	0,3	0,0
Dry mater, %	90,74	90,17	90,81	90,74	90,17	90,81
N-substances, %	15,28	11,65	11,46	15,28	11,65	11,46
Metabolisable energy, MJ	13,55	13,38	13,06	13,55	13,38	13,06
Lysine, g	9,48	7,41	6,30	9,48	7,41	6,30
Zinc - added, $mg.kg^{-1}$	-	-	-	66	66	66

Results and Discussion

In the case of content of zinc [$mg.kg^{-1}$] we measured in experimental group value 11,47±7,97 compared with control group where we found 7,84±13,73 (Tab. II). The difference between the groups recognized statistical significant difference at the level of P≤0.001. The addition of an organic zinc affected the physical indicators of quality of pork which was reflected mainly in the indicators of the actual acidity, meat color and also in indicator electrical conductivity (Tab. V). We found very highly significant differences at P ≤ 0.01 in parameter pH_1 [log.molc (H^+)] where we measured value 6,284±2,399 in experimental group compared with control group 6,183±1,496. Our results are in accordance with study by LI et al. (2007) and RAMSEY et al. (1995) where in the case of experimental group was found statistically significant effect of zinc on value of parameter pH. We measured lower value in the indicator pH_{24} [log.molc (H^+)] in experimental group 5,447±1,808 compared with control group where we found 5,685±1,240 which is in accordance with experiment by LIU et al. (2005). The statistical significance of differences in pH_{24} was P ≤0.001. Statistically significant differences at the level of P ≤0.05 was observed in the indicator electrical conductivity [mS/cm^{-1}]. We measured in experimental group value of electrical conductivity 3,416±13,390 compared with control group where we found value 3,013±15,845. In the case of parameter electrical conductivity measured after 24 hours [mS/cm^{-1}] we found value 6,700±37,400 in experimental group compared with control group where we measured value 8,750±37,897 but the differences between groups were not statistically significant P > 0.05. In parameter drip loss [%] we found higher value of 6,919±41,180 in experimental group compared with control group 6,124±46,977 but the differences between groups were not statistically significant P > 0.05. We found no statistically significant differences between groups in the case of parameter shear force [kg. cm^{-1}]. We measured value of 4,703±16,188 in experimental group compared with control group where we found value of 4,873±16,865 which is in accordance with experiment by LIU et al. (2005) but contrary to study by SALÁKOVÁ et al. (2011). In parameter CIE L^* [$g.100g^{-1}$] measured after 24 hour we found value of 55,423±5,730 and in control group we found value of 58,373±2,901. The statistically significant difference between groups was demonstrated at P ≤ 0.01. In indicator CIE a^*[$g.100g^{-1}$] measured after 24 hours value of 1,287±149,468 which is slightly higher value compared with value in control group. We measured value of 1,049±196,900 in control group. The higher value in experimental group we found in the case of indicator CIE b^*[$g.100g^{-1}$] where we found value of 10,814±11,351 compared with control group where we measured value of 8,724±67,608. This statement of the results of our experiment, however, is not consistent with the study by SALÁKOVÁ et al. (2011) which found no effect of different forms of zinc on color of pork. We found no statistically significant difference between groups P > 0.05 in the case of indicator CIE a^* and CIE b^*. The Indicator CIE L^* [$g.100g^{-1}$] measured after 7 days represented value 58,536±5,118 in experimental group while in control group we found value of 59,269±3,917. We found no statistically significant differences between groups in the case of parameter CIE L^*. In parameter CIE a^*[$g.100g^{-1}$] measured after 7 days we found higher value of 4,751±51,264 in experimental group compared with control group 4,441±55,654 but this result wasn't statistically significant P > 0.05. The statistically significant difference between groups was demonstrated at P ≤ 0.01 in the case of indicator CIE b* [$g.100g^{-1}$] measured after 7 days. We found value of 13,921±11,236 in experimental group while in control group we measured value of 10,390±61,436. The results of our experiment was confirmed by LIU et al. (2005) which stated that value of CIE b^* was demonstrably higher impact of supplementation ration with zinc.

Table 2. Zinc level in musculus longissimus thoracis of pigs (n=35)

Trait	**Control (n=16)** **mean±sd**	**Group organic zinc (n=19)** **mean±sd**
Zinc ($mg.kg^{-1}$)	7,84±1,08^A	11,47±0,91^B

^{A} Different letters denote significant differences between groups at P≤0.01
^{B} Different letters denote significant differences between groups at P≤0.01

Table 3. Chemical composition of musculus longissimus thoracis (n=35)

Trait	**Control (n=16)** **mean±sd**	**Group organic zinc (n=19)** **mean±sd**
Total water, %	72,300±0,738^A	73,172±0,544^B
Total protein, %	24,365±0,607^A	23,399±0,420^B
Intramuscular fat, %	1,556±0,466	1,789±0,617

^{A} Different letters denote significant differences between groups at P≤0.01
^{B} Different letters denote significant differences between groups at P≤0.01

The statistically significant differences were also found in the indicators of the chemical composition of pork (Tab. III). We measured lower value of total protein [%] 23,399±1,796 in experimental group compared with control group where we found value of 24,365±2,490. Differences between the groups were very high statistically significant P≤0,001. In the case intramuscular fat [%] we measured higher value of 1,789±34,471 compared with control group where we found value of 1,556±29,964 but result was no statistically significant P > 0.05. The very high statistically significant difference between groups was demonstrated at P ≤ 0.001 in the case of indicator total water [%] where in experimental group was found value of 73,172±0,743 compared with control group where we measured value of 72,300±1,021. Statistically significant differences were also observed in the case of composition of fatty acids in intramuscular fat of *musculus longissimus thoracis* (Tab. IV). In the indicator saturated fatty acids (SAFA) [g.100g^{-1} FAME] in the experimental group we measured value of 40.168 ± 4.713 compared with the control group where we found the value of 39,379 ± 3,492 but the difference between groups was statistically sinsignificant P > 0.05. Very high statistically significant differences at the level of P ≤ 0.001 was found in parameter polyunsaturated fatty acids (PUFA) [g.100g^{-1} FAME]. Lower value of polyunsaturated fatty acids was measured in the experimental group 7,998±27,785 compared with control group where we found value of 10.736 ± 17.735. Monounsaturated fatty acids (MUFA) [g.100g^{-1} FAME] in the experimental group showed value of 55,753±4,768 compared with control group 51,907±4,165. Value of MUFA was significantly higher P≤0,001 in favor of experimental group. Our results are consistent with REKIEL et al. (2005). Authors detected that chemical composition of *musculus longissimus thoracis* and fatty acid profile (MUFA, PUFA, SFA) were statistically insignificant however in the group where the feeding of zinc oxide was reduced SAFA and increased MUFA and PUFA fatty acids. Although several authors as HILL et al. (2001), HEO et al. (2010), MAVROMICHALIS et al. (2001), ROLINEC et al. (2012) confirmed the positive effect of zinc on feed inatke , positive effect of zinc on the quality indicators of pork were not confirmed what is not in accordance with the results of our experiment.

Table 4. Fatty acids in intramuscular fat of musculus longissimus thoracis (g.100g^{-1} FAME) (n=35)

Trait	**Control (n=16) mean±sd**	**Group organic zinc (n=19) mean±sd**
Monounsaturated fatty acids	51,907±2,162^{A}	55,753±2,658^{B}
Polyunsaturated fatty acids	10,736±1,904^{A}	7,998±2,222^{B}
Saturated faty acids	39,379±1,375	40,168±1,893
ω3 polyunsaturated fatty acids	0,456±0,057	0,452±0,114
ω6 polyunsaturated fatty acids	9,995±1,799^{A}	7,400±2,529^{B}

^{A} Different letters denote significant differences between groups at P≤0.01
^{B} Different letters denote significant differences between groups at P≤0.01

Table 5. Pork quality of musculus longissimus thoracis (n=35)

Trait	**Control (n=16) mean±sd**	**Group organic zinc (n=19) mean±sd**
pH_1 - log molc. (H^+)	6,183±0,092^{A}	6,284±0,151^{B}
pH_{24} - log molc. (H^+)	5,685±0,071^{A}	5,447±0,098^{B}
Drip loss (24 hours) %	6,124±2,877	6,919±2,849
Electrical conductivity (45 min) - mS/cm^{-1}	3,013±0,477^{a}	3,416±0,457^{b}
Electrical conductivity (24 hours) - mS/cm^{-1}	8,750±3,316	6,700±2,506
Colour (24 hours) CIE L*	58,373±1,693^{A}	55,423±3,176^{B}
CIE a*	1,049±2,065	1,287±1,923
CIE b*	8,724±5,898^{a}	10,814±1,227^{b}
Colour (7. day) CIE L*	59,269±2,321	58,536±2,996
CIE a*	4,441±2,471	4,751±2,436
CIE b*	10,390±6,383^{A}	13,921±1,564^{B}
Shear force, (W-B) - kg. cm^{-1}	4,873±0,822	4,703±0,761

^{a} Different letters denote significant differences between groups at P≤0.05
^{b} Different letters denote significant differences between groups at P≤0.05
^{A} Different letters denote significant differences between groups at P≤0.01
^{B} Different letters denote significant differences between groups at P≤0.01

Conclusion

In conclusion we can state that supplementation ration of pigs by organic zinc increased content of zinc in *musculus longissimus thoracis* in the experimental group almost double compared with the control group. This difference showed statistical significance at $P \leq 0.001$ in favor of the experimental group. The addition of an organic zinc affected the physical indicators of quality of pork which was reflected mainly in the indicators of the actual acidity, meat color and also in indicator electrical conductivity. The addition of zinc to the ration of pigs also positively affected chemical composition of pork represented indicators total protein and total water content where we found very highly significant differences between the groups at $P \leq 0.001$. Statistically significant differences were also observed in the case of composition of fatty acids in intramuscular fat of *musculus longissimus thoracis* of pork. We can state based on the results of our experiment and assessment their statistical significance that supplementation of ration by organic zinc has positive effect indicators of quality of pork but compared with results of several researches in this area should be subject of further investigation.

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