THE INCREASE OF THE CONTENT OF VITAMIN E IN THE RATIONS GEESE PRE-SLAUGHTER PERIOD AS A WAY TO STABILIZATION THE LIPIDS IN MEAT

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Experimentally proved the feasibility of the quality improve goose meat by optimizing ration bird. Demonstrated that an increase in vitamin E in the diet of geese is 2,0 times prior to slaughter birds (from 42 to 63 days) promotes to the significant inhibition of lipid peroxidation of meat geese and stabilizing the level of unsaturated fatty acids in the lipids of meat during low temperature storage.

Key words: *lipid peroxidation, vitamin E, TBA-active products, fatty acid composition, essential acids.*

Lipid peroxidation (LPO) is a normal process that occurs in all biological systems. Under normal physiological conditions, lipid peroxidation in the body is maintained at a certain level owing of the functioning of antioxidant system protection (AOP). However, the negative anthropogenic impact, diseases and other harmful factors often lead to intensification of LPO and then lipid peroxidation becomes the mechanism of damage to biological membranes and, eventually, cell death [5,8]. Circulatory arrest after the slaughter of birds leads to inhibition of biosynthesis and activation of destructive processes, is deactivated of the antioxidant protection system (AOP), prooxidant-antioxidant balance is shifting in the direction of lipid peroxidation, which contributes to the accumulation of products of lipid peroxidation, negative changes in the fatty acid composition and deterioration of the

quality of meat products [10].

Meat of the geese, unlike meats of other poultry, characterized by a specific fatty acid composition with a high level of the polyunsaturated fatty acids. Economic expediency compels of farms to limit the duration of cultivation geese for meat to 8-9-week age. Further implementation of carcasses gooses assumes their low-temperature storage. Under these conditions, at braking growth of microflora, accumulation of lipid peroxidation products is the most by negative process that determines the quality of the product, and which is accompanied by a falling of the contents of low molecular weight antioxidants [1, 5, 8, 12] and by a decrease of the main substrate of lipid peroxidation – unsaturated fatty acids (UFA) [10, 15]. Stabilization of the fatty acid composition of lipids of meat at low temperature storage of raw materials is one of the questions that determines its quality. Researches recent years proved possibility increasing the storage period of meat animals by means of increasing of vitamin E in their diet pre-slaughter period [4, 6, 9].

The aim of the work was to determine the influence increased content of vitamin E in the diet of geese pre-slaughter period on the fatty acid composition of lipids of meat and its subsequent changes during low-temperature storage of meat.

Materials and methods. Studies were carried out on the Italian breed of geese agricultural firm «Victoria» Priazovsky district of Zaporozhye region. In day age on the principle of the analogues was formed two groups of geese (control and experimental) to 26 animals each with an average weight of one baby bird (89,8 ± 4,2) g. Geese control group throughout the period of the experience were contained on a standard diet that balanced on the metabolically of energy, protein and vitamins as recommended [11, 16]. Ration goslings of the experimental group in pre-slaughter period (from 42 to 63 days of age) differed from the diet of the control group twice as much on contents of vitamin E (40 mg / kg). Slaughter goslings was performed in 63-days age. Thereafter, pectoral muscles were isolated from a carcasses of geese which quickly were frozen and then were stored at -18 º C in accordance with the State Standard of Ukraine (210 days).

The intensity of lipid peroxidation in tissues of the geese was evaluated by

content products of peroxidation that react with 2 thiobarbituric acid - TBA-active products [2, 5]. Determination was performed in homogenates of tissues ($TBAAP_{init}$) and under the initiation of Fe^{2+} lipid peroxidation ($TBAAP_{ind}$). For integral estimation of activity of endogenous antioxidants in meat used coefficient of antioxidant activity (K_{AOA}), its was calculated as the ratio of the initial level lipid peroxidation (without initiation Fe^{2+}) to Fe^{2+}-induced lipid peroxidation, because meat contains not only substrate of peroxidation, but also high- and low-molecular weight compounds that can inhibit lipid peroxidation [7].

Lipid's extracts for determination of fatty acid composition was prepared by the method of EG Bligh and W.I. Dyer [3] with recommendations F.B. Palmer [14]. Fatty acid composition was determined in the lipid extract by gas-liquid chromatography on chromatograph Carlo Erba (Italy) with ramming glass columns (2.5 m × 3 mm). Mathematical processing of the experimental data was carried out by known methods of mathematical statistics [13].

The results of research. By results of our investigations the meat of geese of control group was characterized by relatively low initial content $TBAAP_{init}$ (table 1).

1. The content of TBA-active products and the coefficient of antioxidant activity in meat geese, nmol / g, M ± m, n = 6

Term of storage, days	The control group			Study group		
	$TBAAP_{init}$	$TBAAP_{ind}$	K_{AOA}	$TBAAP_{init}$	$TBAAP_{ind}$	K_{AOA}
1	18,27 ± 1,08	54,80 ± 0,56*	0,33	36,52 ± 0,37	67,18±0,56*	0,54
30	22,62 ± 0,84	87,00 ± 2,15*	0,26	24,37 ± 0,09	54,82±2,91*	0,44
90	34,26 ± 1,72	137,04 ± 3,61*	0,25	38,12 ± 0,86	86,46±0,14*	0,44
150	14,40 ± 0,63	78,94 ± 0,34*	0,18	16,96 ± 0,30	69,43±1,64*	0,24
210	10,33 ± 0,32	93,64 ± 0,51*	0,11	11,07 ± 0,37	54,08±0,52*	0,20

* - $P \leq 0,05$ in comparison with control group

During the 90 days of storage observed a gradual increase in this indicator to the maximum level. In the second half of the experiment installed decrease of content $TBAAP_{init}$ in the 3,3 times compared to its maximum value.

In the opinion of Russian biochemists, this dynamic secondary products lipid peroxidation in meat during storage speaks that processes of oxidation under anaerobic conditions arising in the tissues immediately after slaughter, due to lack of

the acceptors of hydrogen can not go deep [10]. Therefore in the middle of the experience observed a sharp decrease in $TBAAP_{init.}$ The further activation of POL explained by the accumulation of endogenous oxygen. However, the antioxidant activity coefficient, which reflects the processes of deactivation of endogenous antioxidants in meat of geese control group during the experiment declined steadily and for all period storage decreased 3.0 times.

The initial content of TBKAP in meat goslings of experimental group was 2 times higher, and the average value of this indicator is 27% higher compared with the control group, but for the whole period of the experiment KAOA of meat geese experimental group exceeded the control in the 1.33 - 1.82 times. Thus, the increase in the content of vitamin E in the diet of geese by 2.0 times from 35's to the 63 th day facilitated a significant slowdown deactivation processes of endogenous antioxidants in their meats during low temperature storage.

Analysis of the literature sources [6, 10] shows that depending on the conditions and diet geese FAC of lipids of their meats varies significantly, including the content of essential fatty acids. The level of unsaturation FAC of lipids of meat geese control group in our experiment determined, mainly, oleic, linoleic and palmitoleic acids, and among the saturated – palmitic and stearic acids (table 2).

After storage the total content of UFA in meat geese control group did not change, however, against increasing levels of oleic acid,content of linoleic and linolenic acids in the course of the experiment, respectively decreased by 69.4 and 63.2%, and arachidonic and docosahexaenoic acid - 2.21 and 2.28 times. Changes UFA in lipid of meat at the low- temperature storage aimed at reducing the PUFA content, and consequently the level of unsaturation, which was confirmed by our calculation of this indicator in the meat of geese control group, which decreased during the experiment of 15.0% [7].

2. Fatty acid composition of lipids meats of geese, mass fraction, %, M ± m, n = 6

Fatty acid	After poultry slaughtering		After storage	
	The control group	Study group	The control group	Study group
Myristic (14:0)	0,48 ± 0,02	0,54 ± 0,02	0,45 ± 0,01	0,34 ± 0,01*
Palmitic (16:0)	28,87 ± 1,12	29,5 ± 1,12	31,45 ± 0,97	29,36 ± 1,18
Palmitoleic (16:1)	4,99 ± 0,15	5,24 ± 0,23	3,75 ± 0,17	3,23 ± 0,97
Stearic (18:0)	11,33 ± 0,31	9,89 ± 0,37	9,62 ± 0,41	11,28 ± 0,34
Oleic (18:1)	36,53 ± 1,07	39,66 ± 1,32	44,01 ± 1,39	42,04 ± 1,93
Linoleic (18:2)	9,84 ± 0,34	11,29 ± 0,47	5,81 ± 2,41	8,63 ± 0,29*
Linolenic (18:3)	1,11 ± 0,03	1,41 ± 0,05*	0,68 ± 0,02	0,76 ± 0,03
Eicosenoic (20:1)	0,56 ± 0,02	0,44 ± 0,01*	0,48 ± 0,02	0,53 ± 0,01
Arachidonic (20:4)	3,3 ± 0,09	1,02 ± 0,03*	1,49 ± 0,04	1,49 ± 0,05
Dokozapentayenoic (22:5)	0,17 ± 0,01	0,04 ± 0,00*	0,07 ± 0,00	0,12 ± 0,00*
Docosahexaenoic (22:6)	0,57 ± 0,02	0,18 ± 0,01*	0,25 ± 0,01	0,45 ± 0,01*
All UFA	57,24	59,32	56,73	57,25
Unsaturation UFA, mmol / g	2,89	2,72	2,46	2,63

* - P ≤ 0,05 in comparison with control group

Twice as increased in pre-slaughter period vitamin E diet geese (experimental group) were not significantly changed in the total content their meat of UFA, but helped to increase compared to the control content of linoleic acid in the end of the experiment to 48.5% DPA - 71 4 % and DHA - 80%. These changes composition of the fatty acid of lipids of meats geese determined the sustainable level of unsaturated fatty acids of the experimental group compared with the control. Calculations of unsaturation fatty acids lipids of meat geese in experimental group confirmed stable level of unsaturation during the experiment.

Conclusions. Increase of vitamin E in the diet of geese in 2,0 times in the pre-slaughter period (from 42nd to 63rd day) promotes to the reliable inhibition of lipid peroxidation processes in meat geese and stabilization of unsaturation of fatty acids

of meat lipids during its low-temperature storage.

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ПІДВИЩЕННЯ ВМІСТУ ВІТАМІНУ Е В РАЦІОНІ ГУСЕЙ В ПЕРЕДЗАБІЙНИЙ ПЕРІОД ЯК СПОСІБ СТАБІЛІЗАЦІЇ ЛІПІДІВ У ІХНЬОМУ М’ЯСІ

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Експериментально підтверджено доцільність прижиттєвого поліпшення якості м’яса гусей шляхом оптимізації раціону птиці. Доведено, що збільшення вмісту вітаміну Е в раціоні гусей в 2,0 рази у передзабійний період (з 35-ої до 63-ої доби) сприяє достовірному гальмуванню процесів ліпопероксидації у м’ясі гусей і стабілізації загального рівня ненасиченості жирних кислот ліпідів м’яса під час його низькотемпературного зберігання.

***Ключові слова**: ліпопероксидація, вітамін Е, ТБК-активні продукти, жирнокислотний склад, незамінні кислоти.*

ПОВЫШЕНИЕ СОДЕРЖАНИЯ ВИТАМИНА Е В РАЦИОНЕ ГУСЕЙ В ПРЕДЗАБОЙНИЙ ПЕРИОД КАК СПОСОБ СТАБИЛИЗАЦИИ ЛИПИДОВ ИХ МЯСА

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Экспериментально подтверждена целесообразность прижизненного улучшения качества мяса гусей путем оптимизации рациона птицы. Доказано, что увеличение содержания витамина Е в рационе гусей в 2,0 раза в предубойном периоде (с 42-ти до 63-ох суток) способствует достоверному торможению процессов липопероксидации в мясе гусей и стабилизации уровня ненасыщенности жирных кислот липидов мяса при его низкотемпературном хранении.

Ключевые слова: *липопероксидация, витамин Е, ТБК-активные продукты, жирнокислотний состав, незаменимые кислоты.*