

ACCUMULATION OF VITAMIN E IN THE MEAT OF QUAIL IN ITS DIFFERENT DOSES IN A DIET

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ABSTRACT

In total 20 quails (cross Pharaoh) defined contain of vitamin E (α -tocopherol) in chest muscles. Control group was fed a diet supplemented with basal level of α -tocopherol. Experimental group received a supplemental level of α -tocopherol (300 mg/kg) for 70 days before slaughter (group E-300, $n = 10$). Vitamin E (α -tocopherol acetate) was added to the feed as a 10% solution in oil from the 1st to the 70th day of the experiment. Vitamin E in quail muscle in the experimental group at 1.76 times ($P < 0,01$) higher than the figure in the control group. Thus, the correction feeding of quail accumulate vitamin E in the muscles. There were determined the content of vitamin E in egg yolk in the control and experimental groups. In the experimental group of vitamin E was 76.42 mg / g, which is 2.9 times ($P < 0.001$) than in the control.

INTRODUCTION

Formulation of the problem. The quantity and quality of food, especially of animal origin are of paramount importance in the formation and preservation of human health and maintaining adaptive capacity of the body to its environment. The quality of products is determined, in particular, their microelement and vitamin content, and to a large extent - the content of selenium and vitamin E.

The domestic and foreign researchers studies show the biological properties of vitamin E and of it important role in the human organism, particularly the intracellular antioxidant that provides maturation of sex cells and activate spermatogenesis, contributes a pregnancy and upward function breast [1, 4 5]. It is used in the treatment of hypertension, skin diseases, liver, eyes, with sclerosis of the coronary vessels, as well as neuromuscular degeneration, prevents the formation of free radicals, and increases the body's defenses.

A human daily norm for vitamin E is established differently. Some sources show that it should be 30 I.U. per day, and the rest - around 10-12 I.U. per day [2, 4, 5, 6].

Vitamin E consists in many foods, in vegetable oils (sunflower oil, sea buckthorn oil, sesame oil, soybean oil, corn oil, hemp oil, peanut oil, etc.), vegetables (carrots, cucumbers, potatoes, onions, radishes and so on), in fruits (apricot, raspberry, peach, plum, etc.), in eggs, poultry meat. Therefore, the actual Ukraine over the past decade has become the breeding quail [1-3]. Near farms it is used for the producing high-quality food products - meat and eggs. Of particular interest is the Pharaoh meat breed, characterized by high egg production within 200-220 eggs per year. The live weight of male domestic quail about 110 g, female domestic quail about 150 g. Quail meat is considered a dietary and rich in complete protein, so the production of it is already urgent.

As it is known a special place in the regulation of metabolism and redox reactions in the body of the poultry belongs to the vitamin E, because it is an important natural antioxidant

[6]. Optimal supply poultry vitamin E can receive performance as meat and egg [7]. Vitamin E can be added to the foods as a pharmaceutical drug and as accumulated in meat tocopherol acetate. There are various statements about the quality and usefulness of pharmaceutical vitamin E. Therefore, actual issue was the discovery of the mechanism of accumulation of vitamin E in muscle meat for using it in meat products.

Mostly, vitamin E accumulates in the liver, ovary and quail eggs [2] in this regard the significant factor has a determination of how it accumulates in muscles and poultry. Basically, an enrichment of meat products by vitamin E provides through its accumulation in meat during feeding instead of making a pharmaceutical preparates. In this regard such type of Vitamin E will has both functions an enhancement of the antioxidant grow in body weight and a prolongation of shelf life of products made from poultry meat. Enrichment of such type of meat by vitamin E and accumulation in the muscles will naturally enrich meat products made from it, for the creation a product with desired antioxidant properties and extend their shelf life.

The purpose and objectives. The purpose of the presented work was a study of the accumulation mechanism and determination an amount of vitamin E in the muscles and quail egg yolk, depending on the content of vitamin E in the diet.

MATERIALS AND METHODS

The research carried out at the vivarium and technology laboratory of milk and meat products of Sumy National Agrarian University. In experiments using quail cross Pharaoh. For the laboratory tests the 20 heads of poultry production in the experiments - 20 quails were used. In laboratory experiments with 1-day chicks the principle analogues (age and weight) were formed four groups of 10 heads each. Control group was fed a diet supplemented with basal level of α -tocopherol (Table 1). Experimental group received a supplemental level of α -tocopherol (300 mg/kg) for 70 days before slaughter (group E-300, n = 10). Vitamin E (α -tocopherol acetate) was added to the feed as a 10% solution in oil from the 1st to the 70th day of the experiment. Vitamin E (DL- α -tocopherol acetate -50, stable source of vitamin E in feed) was provided by a commercial company (China). Levels of α -tocopherol in diet are in Table 1.

Table 1 Composition and nutritive value of diet

Item, % (weight)	Groups	
	control	experimental
Corn meal	21.000	21.000
Wheat	22.000	22.000
Barley	10.000	10.000
Pea meal	20.000	20.000
Soybean meal	5.000	5.000
Sunflower meal	10.000	10.000
Fish meal	6.000	6.000
Yeast	2.000	2.000
Mineral supplement	2.000	2.000
Fodder salt	1.000	1.000
Biofactor supplement	1.000	1.000
Total:	100.000	100.000
1 kg contain:		

Table 1 continuation

Metabolisable energy (MJ)	1.144	1.144
Crude protein (%)	207.400	207.400
Crude fat (%)	39.100	39.100
Crude fibre (%)	55.200	55.200
Calcium, g	39.300	39.300
Phosphorus, g	13.300	13.300
Vitamin E, mg	20.040	20.040
added (mg/kg)	30.000	300.000

Options microclimate premises where poultry kept were conformed to hygienic standards and were identical for all groups of birds. For the determining the parameters were selected clinically healthy female quails aged 70 days. Poultry was slaughtered at the age of 70 days. The material for laboratory studies served treated pectoral muscles poultry after decapitation under ether anesthesia. For samples were taken quails of each group in the same time to avoid the daily fluctuations in physiological and biochemical parameters to minimise the influence of stress. After slaughter, the carcasses were chilled at 4°C for 24 h, and the chest muscles were then removed from each carcass. A portion of the sample was used immediately (24 h) and the remaining samples were wrapped in aluminum film and stored in a refrigerator at 4°C for 5 days and in a freezer at minus –25°C for three months until analyzed. At 22 weeks of age was performed determination of vitamin E in egg yolk.

Fed bird artificially manufactured animal feed for free access to water and feed. The concentration of vitamin E (α -tocopherol) in samples) was determined by spectrophotometric method with α , α -dipyridyl at 520 nm (Gyorgy, P., 1951). A mixture of 1.5 ml sample homogenate and 2 ml absolute ethanol and 0.5 ml 1% ascorbic acid was heated at 70°C for 5 min. After adding 1 ml 10 N KOH, the mixture was heated for 30 min. After cooling, 5 ml n-hexane was added for extraction. The solvent was removed by evaporation under nitrogen, and the residue was immediately resolved in absolute ethanol. The content of tocopherol determined by spectrophotometric method at 520 nm (Gyorgy, P., 1951).

RESULTS AND DISCUSSION

Past studies suggest that vitamin E in the diet affects the content of quail muscle. We have examined pectoral muscles, vitamin E in which the experimental and control group differed (Fig. 1). Vitamin E in quail muscle in the experimental group at 1.76 times ($P < 0.01$) higher than the figure in the control group. Thus, the correction feeding of quail accumulate vitamin E in the muscles.

There were determined the content of vitamin E in egg yolk in the control and experimental groups. In the experimental group of vitamin E was 76.42 mg / g, which is 2.9 times ($P < 0.001$) than in the control.

Thus, it was found a correlation between vitamin E in muscle, liver, ovary and egg yolk, depending on its quantity in the diet of birds.

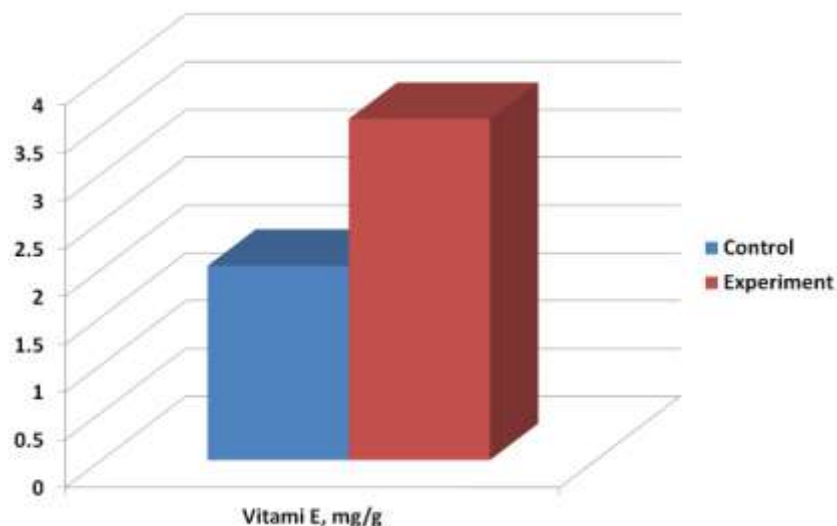


Fig. 1. Vitamin E in quail muscle, depending on its content in the feed ration

CONCLUSION

The addition to the diet a vitamin E in an amount of 300 mg / kg of feed, which is 10 times more than the recommended dose, provide increased content of vitamin quail muscle, and increased content of vitamin E in feed affected the accumulation of it in the yolk of eggs. Feeding a tenfold increased doses of vitamin E in egg yolk 2.9 times ($P < 0.001$) in the muscles - in 1.76 times ($P < 0.01$).

Further research will focus on the development of new technologies and formulations paste and sausage products that will include quail meat, enriched by vitamin E.

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