ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Effect of Protein Additives on the Biological Value of Ham.

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ABSTRACT

In this article, were studied the effect of protein additives such as Lact-ON and AproPORK HF85 on the biological value of the ham. In experiments on laboratory animals from the impact of introducing additives on biochemical parameters of blood and dynamics of the live weight of the animals. Were draw a conclusion about the impact of the consumption of meat products in the body's metabolism.
Keywords: specialized products, meat product, biologically value, protein additives

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ISSN: 0975-8585

INTRODUCTION

One of the most popular meat products is the ham, which is a restructured meat meal. At the same time receive a quality product depends largely on the success of the process of restructuring - recreate the monolithic structure of the meat pieces. Ingredients for a «bonding» is typical for this product. In earlier studies it was found that milk protein-carbohydrate concentrate (MPCC) «Lact-ON» and protein preparation AproPORK HF85 in combination, can significantly improve the functional and technological and organoleptic characteristics of the product [2, 5]. The studied protein supplements have proven to be effective builders capable of providing the necessary consistency and solidity of restructured ham. However, the use of these components could lead to a decrease in food and biological value of products [4, 8, 9].

Thus, it is necessary to examine the biological value of meat product through studies on higher animals. The results of these studies allow a high degree of reliability to assess the impact of the use of a particular product on the functioning of the organ systems of the body. For this purpose, an experiment was carried out to study the effects of replacing part of meat for protein supplements, either alone or with simultaneous application of a product [1, 3].

MATERIALS AND METHODS

The study of the biological value of the developed products was carried out on laboratory animals - white mice. To implement the experiment were four groups of animals formed for three females and two males each. Terms of feeding and watering the animals of all groups were similar. Animals received a mixture of grain (GM) with the additional introduction into the diet of the samples of ham, experience according to the scheme presented in Table 1.

Table 1

Table 1: Schematic of the experiment on laboratory animals

Group	Number of animals	Name of products in the ration
Reference	5	Ham without additives + GM
1 Experiment	5	Ham with MPCC «Lact-ON» + GM
2 Experiment	5	Ham with AproPORK HF85 + GM
3 Experiment	5	Ham with MPCC «Lact-ON» and AproPORK HF85 + GM

In experimental animals was evaluated the dynamics of changes in body weight, as well as studied haematological and biochemical parameters of blood according to standard procedures.

RESULTS AND DISCUSSION

The study of indicators of weight gain in laboratory animals (white mice) is presented in Table 2.

For a comparative study of the growth of experimental animals in addition to the absolute weight gain were identified indicators of relative growth rate (relative increase).

The relative weight gain allows comparative analysis between animals, which exceeds the figure of more than 3% during the formation of groups.

After the allotment in the diet of experimental groups of samples of ham meat product with MPCC «Lact-ON» (group 1), with the drug AproPORK HF85 (group 2), and data sharing of protein supplements (group 3) in white mice there were no significant changes in the growth rate of body weight compared with the control. The intensity of growth remained within the level of this indicator in the group of control animals treated with ham meat product with no substitutions on protein additives.

Thus, making use protein additives do not adversely affect physiological processes in laboratory animals, which is also confirmed by the results of the blood studies (Table 3).

Table 2: Impact of the introduction of the diet of prototypes of ham on the dynamics of the live weight of white mice

Indicators	Reference	1 Experiment	2 Experiment	3 Experiment
Average live weight, g				
Beginning experience, % 100	12,46±0,50	12,5±0,90 100,3	12,2±0,46 97,9	12,3±0,48 98,7
After 30 days, % 100	14,46±0,7	14,3±0,9 98,9	14,0±0,5 96,8	14,6±0,7 101,7
Weight gain				
Absolute, g	2,0	1,8	1,8	2,3
Comparative, %	16,1	14,4	14,8	18,7

Table 3: Effect of the diet of prototypes ham on hematology white mice

Indicators	Reference	1 Experiment	2 Experiment	3 Experiment
Red blood cells (106/mcl)	7,8±0,44	8,7±0,41	7,4±1,12	8,5±0,98
Hemoglobin (g/l)	110,3±3,88	119,4±3,99	118,1±3,68	123,7±3,61
Color index	0,39±0,04	0,43±0,03	0,45±0,04	0,50±0,03
Hematocrit (%)	0,45±0,04	0,49±0,01	0,45±0,04	0,46±0,04
White blood cells (103/mcl)	8,4±0,45	7,5±0,53	7,45±0,46	7,35±0,39

Since the introduction of the diet of prototypes there is an increase in hemoglobin and as a consequence an increase in the color index of blood. The greatest changes in these parameters are observed experimental group 3, which we believe is due to the presence of these groups in the diet containing both ham with additives, which apparently leads to an intensification of erythropoiesis (formation of red blood cells) [6, 10]. Elevated levels of white blood cells in the blood of control animals probably due to increasing revenues in the gastro-intestinal tract enriched food proteins (ham meat product), triggering defense response to receipt of the foreign protein in the blood and increased the number of leukocytes for the neutralization products of nitrogen metabolism. Introduction of prototypes containing protein supplements neutralize the effects caused by the intake of pure meat products.

Enriching the diet of laboratory animals proteins by feeding ham meat products leads to an increase in the blood levels of lipids, mainly due to an increase in the content of this fraction of triglycerides and cholesterol, which may be a threat in the future development of atherosclerosis and obesity. Feeding the test product with protein supplements reduce blood levels of total lipids. The best result in the normalization of lipid metabolism and reduce the threat of obesity and atherosclerosis showed a prototype of the contents of both of the studied additives (Table 4).

Table 4: Effect of the diet of prototypes ham on biochemical blood of experimental animal

Indicators	Reference	1 Experiment	2 Experiment	3 Experiment
Total lipids (g/l)	5,0±0,49	4,83±0,36	3,76±0,59	3,1±0,4
Cholesterol (mmol/l)	1,08±0,08	0,82±0,09	0,8±0,11	0,86±0,11
Triglycerides (mmol/l)	1,43±0,2	0,92±0,06	0,88±0,03	0,9±0,04
Total protein (g/l)	69,0±2,99	65,96±2,7	68,6±2,6	72,9±2,53
Urea (mmol/l)	4,74±0,53	6,2±0,6	6,5±0,68	6,1±0,75
Glucose (mmol/l)	6,12±1,2	7,48±1,36	4,98±1,45	5,78±1,38
Sodium (mmol/l)	104,3±3,4	87,84±4,21	76,33±4,91	71,87±3,3
Potassium (mmol/l)	4,78±0,33	5,44±0,26	5,75±0,47	5,2±0,32
Calcium (mmol/l)	2,68±0,15	3,48±0,11	3,0±0,16	3,3±0,12

The study of the effect of test samples of products on protein metabolism showed that in all cases there is an increase in the blood levels of total protein and nitrogen metabolism (increased blood urea content). Note that when administered in a diet product prototypes protein metabolism is enhanced in comparison with the group feeding ham without protein additives.

Introduction to the diet of animals prototypes of products reduces blood levels of glucose, which explains the results on the effect of these samples on lipid metabolism. Reduction of blood glucose levels reduces the activity of lipid biosynthesis and hence the risk of cardiovascular and obesity - cardiovascular diseases.

Changes in blood biochemistry in the experimental groups are in good agreement with the indicators of mineral metabolism. When administered in the diet of the prototypes is observed decrease in the content of sodium in the blood and increased potassium and calcium. These changes in mineral metabolism may be regarded as a favorable factor in reducing the risk of subsequent hypertension and other cardiovascular diseases. It is important to note that the largest increase in blood calcium level was observed in 1 and 3 experimental groups treated with the addition product MPCC «Lact-ON», characterized by a high content of calcium in its composition [7].

CONCLUSION

Thus, on the basis of the data obtained, we can conclude about the positive impact of the replacement of raw meat on protein additives MPCC «Lact-ON» and AproPORK HF85 for biological value of the product. Improving metabolism suggests reducing the risk of nutritional diseases developed in the use of meat products.

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