The Influence of different growing modes on the physiological state of mulard ducks

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Abstract. This paper discusses the use of feed additives with the addition of amino acids containing methionine and cysteine. To study the effectiveness of the use of feed additives, one of the main functional systems of the body of any animal, blood, was monitored. In confirmation, blood samples were taken for hematological and biochemical examination. It is shown that in the first months of use there is an increase in the weight of ducks, and in the period of egg production there is a decrease in productivity. Reduced productivity is associated with the preparation and restructuring of the body for egg production. New approaches to the development of feed additives are needed to assess the state of health and predict the quality of products. Great importance is given to standard methods of studying and identifying certain patterns in the clinical, anamnestic, morphological, metric and anatomical parameters of the bird body.

1. Introduction
Nowadays, in poultry farming, when growing highly productive lines and crosses, a thorough scientific development of the system and norms of poultry feeding is required, as well as the optimal ratio of nutrients and the correct physiological functioning of the body. One of the main production stages in the poultry industry is associated with the feeding process, which should be based on basic scientific developments, including the morphology and biochemistry of the blood composition depending on the composition of the diet, the identification of the nutritional value and quality of the obtained products.

The aim of the study was to study the effect of feed additives with the addition of amino acids containing methionine and cysteine on the physiological and biochemical status and growth of ducks [1-6].

2. Materials and methods
Healthy ducks were selected for the experiment. When keeping the animals, veterinary and sanitary and zootechnical requirements were satisfied. Doses of drugs for assition into mixed fodder were determined empirically and were introduced on the basis of a daily ration. The mixture was prepared in a mixer immediately before use.

To conduct the study on the principle of analogs, 5 groups of 22 heads each were formed.

The birds were taken from the main herd. The birds of the first experimental group received 1.0 g of methionine and cysteine per 1 kg of feed, the second group - 1.5 g/kg, the third - 2.0 g/kg; in the
diets of groups 4 and 5 - 2.5 g/kg and 3 g/kg, respectively. The ducks were kept up to 56 days of age. In the control group, the birds were not fed with amino acid supplements [7-8].

3. Results and discussion
A necessary condition for the use of feed additives in the diets of farm animals and poultry is, first of all, to clarify their effect on the physiological condition.

The data obtained on the number of erythrocytes in the blood indicate that the most positive effect can be noted in experimental groups 3, 4 and 5. The erythrocytes in the blood of ducks in the experimental groups were 2.5; 8.1; 5.1% more compared to analogs of the control group (table 1).

Table 1. Hematological parameters of ducks.

| Groups      | Erythrocytes | Leukocytes | Hemoglobin, g/l |
|-------------|--------------|------------|-----------------|
| 1 (control) | 2.34 ± 0.17  | 29.5 ± 2.13| 132.5 ± 12.23   |
| 2           | 2.38 ± 0.19  | 29.5 ± 2.24| 132.8 ± 11.84   |
| 3           | 2.40 ± 0.17  | 29.7 ± 2.71| 137.8 ± 12.37   |
| 4           | 2.53 ± 0.21  | 31.1 ± 2.56| 139.4 ± 11.21   |
| 5           | 2.46 ± 0.17  | 29.9 ± 2.39| 139.1 ± 10.98   |

The tabular data shows that the hemoglobin content increased by 4; 5.2 and 4.9%, in comparison with analogs in the control. It can also be noted that in the number of leukocytes in the blood of ducks, we can also see a slight increase (table 2).

Table 2. Biochemical parameters of the ducks blood at 56 days of age.

| Groups     | Total protein, g % | Immunoglobulins, ea | Cholesterol, mg/% | Lipids, mg/ % |
|------------|--------------------|---------------------|-------------------|---------------|
| 1 (control)| 3.55 ± 0.05        | 4.51 ± 0.40         | 112.3 ± 3.77      | 534.7 ± 9.0   |
| 2          | 3.62 ± 0.10        | 4.58 ± 0.35         | 117.9 ± 5.31      | 551.8 ± 19.2  |
| 3          | 3.67 ± 0.07        | 4.68 ± 0.30         | 116.7 ± 3.98      | 556.6 ± 18.9  |
| 4          | 3.63 ± 0.09        | 5.00 ± 0.23         | 119.0 ± 3.48      | 564.1 ± 21.3  |
| 5          | 3.64 ± 0.12        | 5.04 ± 0.21         | 116.8 ± 5.42      | 547.5 ± 19.3  |

As a result of the experiment, it was found that the use of cysteine and methionine leads to an increase in the total protein content in the blood serum of ducks in 3, 4 and 5 experimental groups. The indicators in these groups are higher than in the control by 0.1 g/%. The increase in the amount of total protein is perhaps due to a change in the content of the beta fraction.

Serum immunoglobulins are of great importance in maintaining local immunity, since they are the primary receptors for antigens and characterize the immune reaction of the bird's body.

When analyzing this indicator in our experiment, the maximum level of immunoglobulins in the blood serum of ducklings from 4 and 5 experimental groups was noted. In these groups, it exceeds the benchmark by 10.9 and 11.8%.

Changes in the content of total lipids, non-esterified fatty acids, cholesterol, calcium and phosphorus indicate a positive effect of the cysteine and methionine drug on the main types of metabolism, such as lipid, carbohydrate and water-mineral in the body of birds.

In ducks of group 4, the content of total lipids was 10.6%, EFA by 10.5%, glucose by 7.7% higher than in the control group.

All this allows us to conclude that the amino acids we used as additives in compound feed have immunoprotective properties (table 3).

Analysis of the data in the table allows us to note that the live weight of ducks in all groups in the first month of productivity continues to increase. With the beginning of intensive egg-laying, a
tendency towards a decrease in live weight is outlined. This phenomenon occurs until the end of the productive period. The live weight of the ducks of the experimental groups by the end of the laying period was higher by 0.77-0.15 kg, in particular, in birds of groups 4 and 5, which supplements of methionine and cysteine were consumed during the rearing periods and during the productive period - by 0.14 and 0.130 kg, respectively.

| Table 3. Poultry weight gain in the productive period, kg. |
|----------------------------------------------------------|
| A month of oviposition | March | April | May | June | July | August |
|-------------------------|-------|-------|-----|------|------|--------|
| 1(control)              | 3.30±0.04 | 3.32±0.03 | 3.32±0.03 | 3.27±0.03 | 3.22±0.04 | 3.18±0.04 |
| 2                       | 3.33±0.03 | 3.36±0.04 | 3.36±0.02 | 3.32±0.04 | 3.30±0.04 | 3.27±0.04 |
| 3                       | 3.33±0.05 | 3.36±0.03 | 3.37±0.02 | 3.33±0.04 | 3.30±0.04 | 3.29±0.04 |
| 4                       | 3.36±0.04 | 3.39±0.03 | 3.39±0.03 | 3.36±0.04 | 3.33±0.03 | 3.32±0.04 |
| 5                       | 3.35±0.05 | 3.37±0.03 | 3.39±0.03 | 3.36±0.04 | 3.32±0.03 | 3.31±0.04 |

The liver was used as the main object of biochemical analysis. It plays a small role in the metabolic process. All substances absorbed into the blood necessarily enter the liver and undergo various metabolic transformations. There is the synthesis of various biogenic substances: proteins, fats, phospholipids, etc., as well as the deposition of various metals and vitamins.

At the end of the experimental period, the content of the following vitamins was determined in the ducks' liver: A, E, B₁ and B₂. The data obtained are presented in table 4.

| Table 4. Content of vitamins A, E, B₁ and B₂ in duck liver. |
|----------------------------------------------------------|
| Vitamins | A, μg/g | E, μg/g | B₁, μg/g | B₂, μg/g |
|----------|---------|---------|----------|----------|
| 1(control) | 144.20±3.56 | 20.30±0.20 | 6.05±0.20 | 17.50±0.51 |
| 2         | 145.10±3.09 | 28.86±0.19 | 7.9310.19 | 18.42±0.40 |
| 3         | 152.30±2.89 | 29.38±0.23 | 8.11±0.26 | 19.22±0.39 |
| 4         | 159.10±3.73 | 29.12±0.28 | 8.94±0.32 | 22.90±0.29 |
| 5         | 148.90±3.00 | 29.40±0.26 | 8.44±0.26 | 24.81±0.34 |

Analyzing the data obtained, it can be noted that the addition of methionine and cysteine feed additives contributes to a significant increase in the content of B vitamins in the liver of ducklings. The content of thiamine in the liver of experimental ducklings in groups 2, 3, 4 and 5 is significantly higher (p <0.001) than in control group 1 by 31.1; 34.0; 47.8; 39.5 and 27.4%, in groups respectively, and riboflavin by 5.2; 9.8% in groups 2 and 3, and in groups 4 and 5 highly significant (p <0.001) at 30.8; 41.7 and 21.1% [9-11].

4. Conclusion
The biological usefulness of duck meat is determined by the usefulness of the protein composition and the content of essential amino acids.

As a result of biochemical studies of duck meat, we determined that by the amount of essential amino acids in sample No. 1 their content is less than in sample No. 2 and No. 3 by 3.5% and 6.5%, respectively. The essential amino acids in the thigh muscles of broiler birds were most of all contained in sample No. 3 by 10.5% compared with the other two studied samples.

Thus, the results of the studies have shown that the inclusion of feed additives containing essential amino acids in the diet of ducks has a beneficial effect on the absorption of nutrients in the diet and had a positive effect on their meat productivity.
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