Effects of bio-sorb-selenium on productive and biological indicators of gosling broilers

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Abstract. Bio-Sorb-Selenium is a supplement absorbing toxins and enriching feed with organic selenium. The scientific and economic experiments on gosling broilers of an Italian white breed were carried out at the Breeding Plant “Makhalov”, Kurgan Region. For gosling broilers of the control group, complete feed was used (OR), for the first experimental group, Bio-Sorb-Selenium at a dose of 500 g/t was used; for the second experimental group, 1000 g/t feed was used. Bio-Sorb-Selenium in the composition of animal feed had a significant impact on biological and productive indicators of goose broilers, in particular on the morphological parameters of blood up to 58%, on the biochemical indicators of blood up to 61%, on natural resistance indicators up to 76% and meat productivity up to 60%. A strong correlation between the body weight of goslings and some morphobiochemical blood parameters was revealed.

1. Introduction
To increase the efficiency and competitiveness of the meat poultry industry, a comprehensive solution of organizational, economic and technological problems based on the latest scientific achievements and adaptation of production to market needs is needed. The most important task is the use of supplements which can prevent poultry diseases, expand the food base, implement the potential of the bird and environmental safety of products [1, 2, 4].

In recent years, the use of environmentally safe biologically active components and preparations that have a positive effect on biochemical, immunological, hematological and productive indicators is of great interest [3].

Bio-Sorb-Selenium is a supplement absorbing toxins and enriching feed with organic selenium consisting of schungite, clinoptilolite, montmorillonite, and also diacetophenonylidene.

The research purpose is to determine the influence and relationship between productive and biological indicators of gosling broiler fed with Bio-Sorb-Selenium.

2. Research methodology
The scientific and economic experiment was conducted at the Breeding Plant “Makhalov”. 3000 goose broilers of an Italian white breed were divided into 3 equal groups. The breeding duration was 60 days. Conditions, layer density, feeding and watering fronts, microclimate parameters were equal. For gosling broilers of the control group, complete feed was used (OR), for the first experimental group, Bio-Sorb-Selenium at a dose of 500 g/t was used; for the second experimental group, 1000 g/t feed was used.
Weighing was carried out individually (50 animals from each group) in 10 days before the morning feeding.

At the end of breeding, the goslings were slaughtered and cut in order to identify the effect of supplements on meat productivity by the methods described by the Academy of Agricultural Sciences and VNITIP [2].

The usefulness of feeding and health were controlled by examining the blood composition. The following parameters were determined: the number of red blood cells - in the Goryaev’s counting chamber; leukocytes – by the vitro method; hemoglobin – using the transforming solution; the globular value - by calculation; the alkaline reserve - according by the Pozysyaiku’s method; total protein, residual nitrogen - by colorimetrication at FEC; total nitrogen - by the Kjeldahl method; serum protein fractions – using the phosphate buffer in turbidity solutions; calcium – by the de Waardu’s method; inorganic phosphorus - by the Birgs colorimetric method accounting for changes made by V.Ya. Yudelovich; phagocytic activity – by the Gostev’s method; leukogram - by counting leukocytes stained by the Romanovsky-Giemsa’s method; lysozyme and bactericidal activity of blood serum.

The experimental data were processed using the biometrics methods described by G.P. Leshchuk et al., Microsoft Excel and the electronic online calculator (www.math.semestr.ru). The difference was considered significant at P <0.05.

3. Research results

The use of correlation indicators between the signs has practical significance for improving productive qualities of animals [4].

The linear correlation coefficient had values from –1 to +1. The links between the features can be weak and strong. Their criteria are ranked by the Cheddok Scale: 0.1 < r_{xy} < 0.3: weak; 0.3 < r_{xy} < 0.5: moderate; 0.5 < r_{xy} < 0.7: significant; 0.7 < r_{xy} < 0.9: high; 0.9 < r_{xy} < 1: very high.

Figure 1 shows the relationship (correlation coefficient) of live weight and morphological indicators of gosling broilers.

![Figure 1. Relationship (correlation coefficient) of live weight and morphological indicators of gosling broilers.](image)

There is a high positive relationship between the body weight and the number of erythrocytes. At the same time, the goslings from the first experimental group had a very high value. Between the body weight and the color index, correlation coefficients were high negative.
Table 1. The influence of the Bio-Sorb-Selenium on morphological blood parameters, %

| Indicator                  | Group 1st | Group 2nd |
|----------------------------|-----------|-----------|
| Erythrocytes, x 10^{12} / l| 1.04      | 19.40     |
| Leukocytes, x 10^{9} / l   | 52.32 *   | 57.80 *   |
| Hemoglobin, g / l          | 16.98     | 37.44     |
| Globular value             | 0.55      | 4.68      |

*P≤0.05

It was revealed that Bio-Sorb-Selenium (P≤0.01) influences the number of leukocytes. A rather high effect of Bio-Sorb-Selenium on the hemoglobin level in the blood of the second group of goslings was observed.

Figure 2 shows the relationship (correlation coefficient) of live weight and blood biochemical parameters of goslings.

A moderate positive relationship between the live weight and all biochemical blood parameters of broilers was observed in the second experimental group. A high correlation was observed between the body weight and the calcium content in the first group.

In 1 experimental group, a. In the goslings of the control group, the relationship between body weight and all biochemical parameters was negative.

Table 2 presents the results of calculation of the influence of Bio-Sorb-Selenium on the biochemical blood parameters.

It was established the influence of Bio-Sorb-Selenium on biochemical parameters varies from 2.73 to 60.64%. The supplement has a significant effect on the indicator of residual nitrogen in the blood of the first group (57.39% (P≤0.01)). In the second experimental group, the strong influence of total protein (58.69% (P≤0.05)), total nitrogen (60.64% (P≤0.01)) and inorganic phosphorus (51.93 % (P≤0.05)) was identified.
Table 2. The influence of Bio-Sorb-Selenium on biochemical blood parameters of goose broilers, %

| Indicator                      | Group       |
|--------------------------------|-------------|
|                                | 1st         | 2nd         |
| Alkaline reserve, mg%          | 2.73        | 15.67       |
| Total protein, g / l           | 35.42       | 58.69 *     |
| Residual nitrogen mg%          | 57.39 *     | 29.63       |
| Total nitrogen, mg%            | 20.14       | 60.64 **    |
| Calcium, mmol / l              | 23.57       | 37.16       |
| Inorganic phosphorus, mmol / l | 5.81        | 51.93 *     |

* P ≤ 0.05; ** P≤0.01

Figure 3 shows the relationship (correlation coefficient) of the live weight and natural resistance of goslings.

![Relationship (correlation coefficient) of live weight and natural resistance of goslings.](image)

**Figure 3.** Relationship (correlation coefficient) of live weight and natural resistance of goslings.

Phagocytosis plays an important role in protecting the body from foreign factors. An impaired function increases susceptibility to infections.

In goslings-broilers of the first experimental group, a positive relationship between the body weight and natural resistance and the phagocytic index was strong. In goslings of the second experimental group, a negative relationship between the live weight and the phagocytic number (-1.00), the phagocytic index (-0.72) and the phagocytic capacity (-0.53) was identified.

Table 3 presents the results of calculation of the influence of Bio-Sorb-Selenium on the natural resistance of goslings.

Table 3. The influence of Bio-Sorb-Selenium on natural resistance of goose broilers, %

| Indicator                      | Group       |
|--------------------------------|-------------|
|                                | 1st         | 2nd         |
| Phagocytic activity,%          | 6.04        | 21.78       |
| Phagocytic number              | 55.39 *     | 72.23 ***   |
| Phagocytic index               | 23.22       | 28.33       |
| Phagocytic capacity, thousand mic . tel | 70.15 *** | 75.97 *** |

* P ≤ 0.05; *** P≤0.001
It was found that Bio-Sorb-Selen influences the phagocytic number of blood increasing it by 55.39% (P≤0.05) in the first experimental group and by 72.23% (P≤0.001) in the second experimental group. The strong relation between Bio-Sorb-Selenium and the phagocytic blood capacity was observed: 70.15% (P≤0.001) - in the first experimental group, and 75.97% (P≤0.001) - in the second experimental group.

Table 4 presents the results of calculation of the influence of Bio-Sorb-Selenium on meat productivity.

| Indicator                        | Group 1st | Group 2nd |
|----------------------------------|-----------|-----------|
| Pre-slaughter weight             | 39.16     | 46.67 *   |
| Mass of half gutted body         | 39.39     | 46.67 *   |
| Mass of gutted body              | 47.91 *   | 56.08 *   |
| Mass of edible parts             | 48.25 *   | 60.29 *   |
| Mass of inedible parts           | 26.36     | 8.72      |
| Muscle mass                      | 47.67 *   | 60.32 *   |

* P ≤0.05

In the second experimental group, Bio-Sorb-Selenium had a greater impact on meat productivity. At the same time, it influenced the muscle mass (60.32%) (P≤0.05) and the mass of edible parts (60.29%) (P≤0.05). The supplement had the same effect on the pre-slaughter live weight and the weight of the half-gutted carcass increasing them by 46.67% (P≤0.05). It increased the mass of the gutted carcass by 56.08% (P≤0.05).

In the first experimental group, Bio-Sorb-Selen had a less significant effect. The mass of the gutted carcass increased by 47.91% (P≤0.05), the mass of edible parts increased by 48.25% (P≤0.05), and the muscle mass increased by 47.67% (P≤0.05).

4. Conclusion

Thus, Bio-Sorb-Selenium has a significant impact on the biological and productive indicators of broilers: it improved morphological parameters of blood by 58%, blood biochemical indicators - by 61%, natural resistance - by 76%, and meat productivity - by 60%. A strong correlation between the body weight of goslings and some morphobiochemical blood parameters was revealed.

Bio-Sorb-Selenium in the composition of compound feeds for goose broilers helps produce birds with a high meat productivity.

References

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