Biologically active additives, their effect on the egg production of geese, hatchability, and development of goslings

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Abstract. The prospects of goosewatch development are determined by several factors: goose meat contains 17.5-18.5% protein, 22-23% of fat, 0.9-1.0% of ash. Insufficient reflection of these issues in the husbandry industry, peasant farms determined the direction of our study – the study of the impact of "Pozitron-2 Air 1" artificial ozonizer on the microclimate of the plant growing geese and biologically active additives "Bacell", "Larikarvit" and "Sporobacterin" on the body of geese and goslings. When performing research work, zoohygienic, hematological, biochemical, zootechnical, veterinary and sanitary, economic research methods using modern methods and instruments were used. The conducted studies had shown that 3-hour sessions of ozonation with the specified device at a dose of 0.02 m³ of ozonated air per 1 m³ of purified air of the room significantly changed the state of the microclimate in it for the better. Thus, the relative humidity in the room for growing goslings after ozonation significantly decreased from 78.64± 0.16 to 71.12± 0.14%, that is, on average by 7.52% (P<0.05), ammonia concentration - by 22.73% (P<0.01), hydrogen sulfide – by 32.27% (P<0.01), carbon dioxide – by 18.18% (P<0.01), dust – by 60.56% (P<0.001), microorganisms – by 46.94% (P<0.01) (P<0.001).

These data indicated that the tested artificial ozonizer Pozitron-3 Air-1 improved and normalized the microclimate in the room for growing goslings. When testing new dietary supplements, goose egg laying, hibernation hatching and hatchability were important indicators. The results of the study showed that egg production in geese of experimental groups, against the background of the use of dietary supplements "Larikarvit", "Bacell", "Sporobacterin", compared with analogues in the control of February – June was higher by an average of 6.44%, 7.49%, 6.64% (P<0.01). Among these experimental groups of birds, in comparison with intact birds, the highest egg production was in the second experimental group of goslings, where the biologically active additive "Bacell" was used as part of the main diet, within 7.49% (P<0.01). As it is known, the output of young animals in goose breeding is determined by the number of viable, healthy goslings, expressed as a percentage of the number of eggs laid in the incubator. The results showed that this important indicator in the application of dietary supplements in the diet of geese in experimental batches, compared with the control batch was significantly higher by 7.71, 10.31, 8.85 (P<0.05) percent.

1. Introduction
Geese are an important reserve for increasing of poultry production. Their meat is characterized by high caloric content. The experience of advanced geese farming shows that geese give an exceptional economic effect, especially when using intensive technology of growing geese for meat [1-10].

With intensive methods of geese farming at specialized poultry farms, large farms and peasant farms, the creation and maintenance of an optimal microclimate remains a serious problem. In this regard, the poultry yards microclimate quality indicators improvement should be accompanied not only by the regulation of the known complex of air environment physical and chemical factors in the modern conditions, but also by an increase in its biological activity, as well as air sanitation through its purification and disinfection. Currently, there are several ways of air sanitation: application of air filters, ozone-air mixture, bactericidal radiation, and air ionization, etc. [11-15].

Prospectivity of the geese farming development is determined by a number of factors. Geese are fast growing birds, body weight of goslings increases by 45-50 times daily from to 9-10 weeks of age and reaches 4.6-6.0 kg, at a cost of no more than 3 kg of concentrated feed per 1 kg of body weight gain. Muscle tissue accounts for 37-39%, skin with subcutaneous fat – 14-16%, internal fat – 6,7% in carcasses of geese up to 9-10 weeks of age. Goose meat contains 17.5-8.5% protein, 22-23% fat, 0.9-1.0% ash [16-26].

Biologically active additives are used as growth promoters of animals, birds and are becoming increasingly popular in modern poultry farming. After all, it is not only antibacterial agents that reduce the risk of diseases of the gastrointestinal tract but also stimulate the consumption of feed, due to the active secretion of saliva and digestive enzymes that increase its digestibility. In poultry, increasing attention is paid to improving bird health and productivity. In this regard, the role of the immune system is difficult to assess. On the one hand, it provides reliable protection against most infectious and invasive diseases, and, on the other hand, the effectiveness of immunization depends on immunocompetence. There are a lot of problems associated with both increased morbidity and mortality of birds, especially young, and with their poor growth and development with a low nonspecific and specific resistance of the body in birds [27-34].

The lack of attention to the problematic issues in geese farming industry determined the direction of our research. So, we focused on the study of the effect of biologically active feed additives as "Laricarvit", "Bacell" and "Sporobacterin" on the body of geese and goslings.

New biologically active additives and probiotic feed preparations were tested in production conditions and introduced into the practice of poultry farming in accordance with the "Regulation on the Procedure for Testing of New Veterinary Drugs". The correct use of various feed additives and biologically active substances, the number of which is constantly increasing, is one of the factors of increasing the natural resistance, survival rate and productivity of birds, reducing of feed consumption per unit of production and improving the efficiency of the poultry breeding [35-41].

The creators' applications of "Laricarvit", "Bacell" and "Sporobacterin" to the leadership of the Chuvash State Agricultural Academy to test these biologically active additives on different types of poultry farming in the conditions of farms of the Chuvash Republic were the basis for research on the testing of biologically active additives (LLC "Biotekhagro", the Krasnodar Territory, Timashevsk; LLC "Bakoren", Orenburg).

The aim of this work was the optimization of the microclimate in the goose growing stock plant using artificial ozonizer "Pozitron - 3 Air 1" and the study of influence of biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" on the egg production of geese, morphological, biochemical status and development of goslings.

2. Material and methods
Testing of "Laricarvit", "Bacell" and "Sporobacterin", the biologically active additives, was conducted in geese farming farm of the Tsivilsky District of the Chuvash Republic on 200 geese and 480 goslings of "Linda" breed. Scientific and economic experiments on studying of the effect of above mentioned biologically active additives on egg production, hatching and hatching of goose eggs, as well as survival rate, quality, and productivity of goose growing stock were conducted in the period from 2017-2018.
Pozitron-3 Air 1 is a device of ozone disinfection of air, which is intended to clean air in rooms from dust, microorganisms, carcinogenic and strongly smelling substances. This is due to the fact that ozone has high penetrating power, has a bactericidal effect on many pathogenic and opportunistic bacteria. Also, ozone kills the virus, destroying its membrane, damaging the cell both outside and inside. If you compare ozone with the usual means against bacteria, it is 600 times stronger than chlorine, and it kills bacteria several times better than ultraviolet rays [13].

Air ozonation was carried out in the room for growing geese to improve the microclimate. In this case, the specified ozonizer was used. After the birds were cleared from the room, and its pre-cleaning, Pozitron-3 Air 1 was used daily for 6 days to ozone the room, with a three-hour exposure, at a dose of 0.02 m3 of the ozonated air per 1 m3 of air to be cleaned. The main parameters of the microclimate were estimated with the appropriate devices before and after this procedure.

Experiment on establishing the effect of the tested biologically active additives on the egg production of geese was carried out on 200 geese of "Linda" breed, which according to the principle of analogues were divided into 4 groups (control and three experimental), 50 heads in each. Adult geese daily got biologically active additives from February to June as part of the main diet during 150 days: the first experimental group got "Laricarvit" at the rate of 3.0 kg/t of feed, the second experimental group got "Bacell" in the amount of 2kg/t of feed, the third experimental group got "Sporobacterin" at a dose of 1.0 ml/100 kg of body weight. The control group birds were on the main diet without biologically active additives.

480 geese, which were divided in four groups (control and three experimental) 120 heads each, were selected in order to establish the influence of the above mentioned biologically active additives to be tested on the growth, development and survival rate of birds on the principle of analogues. Gooslings got biologically active additives from the first days of life during 75 days as a part of a diet: the first experimental group got "Laricarvit" at the rate of 2.5 kg/t of feed, the second experimental group got "Bacell" in the amount of 1.5 kg/t of feed, the third experimental group got "Sporobacterin" at a dose of 0.5 ml/kg of body weight.

The birds of the control group were on the main diet. Zoohygienic conditions of keeping and feeding for all groups of birds were the same. The following research methods are used in the performance of research work:

1) zoohygienic methods - the air temperature was measured with a thermometer, the relative humidity of the air with the "TKA-PKM" universal device (model 42), the carbon dioxide concentration by the Subbotin-Nagorsky method, the content of ammonia and hydrogen sulfide by the universal gas analyzer UG-2, the speed of air movement was estimated with hot-wire anemometer; concentrations of dust and microorganisms in the rooms - with Krotov apparatus when assessing the microclimate in the growth room. Air ozonation was carried out with "Pozitron-3 Air 1", a modern artificial ozonizer, in accordance with the instructions for its use, in the growth room.

2) hematological methods - the number of erythrocytes, leukocytes, hemoglobin in the blood was determined using veterinary hematological analyzer "Vetsan HM-5". Blood from geese was usually taken in the morning before feeding from the axillary vein, 15 samples from each test group, every 10 days of the experiment.

3) biochemical methods – the total protein content in the blood serum of animals was determined by IRF-454B-2M Refractometer, individual protein fractions were determined by the nephelometric method.

4) immunological methods – lysozyme activity of blood serum was estimated using M. lisodeiticus sewage culture, phagocytic activity of neutrophils using daily agar culture St. aureus, bactericidal activity of blood serum using daily E. Coli culture.

5) zootenchnical - the gain in live weight of goslings was determined by regular weighings of goslings on electronic scales on the 1st, 20th, 20th, 4th, 50th, 60th, 76th day of the experimental work;

6) veterinary and sanitary examination of meat was carried out according to organoleptic studies (appearance, consistency, smell, the degree of bleeding) and in accordance with the "Rules of Veterinary Inspection of Poultry and Veterinary and Sanitary Examination of Poultry Meat".
7) economic methods - economic efficiency of the use of biologically active additives in the cultivation of goose growing stock was calculated by the method of I. N. Nikitin (Nikitin, I. N. Organization and Economics of veterinary business: textbook. / I. N. Nikitin, M. H. Voskoboinik. M.: Humanitarian Publishing Center VLADOS, 1999. P. 209–251).

8) statistical methods - statistical processing of the results was carried out by the method of Oivin using Studen's tables.

"Laricarvit" is a biologically active additive produced by JSC "Petrokhim" (Belgorod City), which is intended to enrich diets of animals and birds with beta-carotene, chlorophyll, and flavonoids for the purpose of increase of survival rate, productive and reproductive qualities. The following active ingredients are contained in 1 kg of the preparation: chlorophyll – not less than 500 mg/kg, beta-carotene – not less than 1700 mg/kg, bioflavonoid complex of larch – not less than 700 mg/kg, as well as filler – silicon dioxide – up to 1 kg may be used for food purposes without restrictions [18].

"Bacell" is produced by LLC "Biotekhagro" (Registration Number PVR-1-4.7/02100 d. Timashevske of the Krasnodar Territory), consists of microbial mass of spore-forming bacteria Bacillus subtilis 945 (B - 5225); acidophilic bacteria Lactobacillus acidofilus L917 (B – 4625); Ruminococcus albus 37 (B-4292); sunflower meal, or products of grain or legumes. 1 g of biologically active additive contains, at least, 1 x 108 CFU (colony forming units) of bacteria of each species and does not contain GMO [39].

«Sporobacterin liquid» is a probiotic of a new generation of production Bakoren, LLC (Orenburg City, Registration Certificate PN 000792/01 of 14.03.2011), is a suspension of living bacteria of the strain Bacillus subtilis 534 [38]. The preparation is allowed for use in medical practice, veterinary medicine, and livestock farming. The bacteria of the strain produce proteolytic enzymes (proteases, lipases, endogenous interferon), contributing to the improvement of protein digestibility by, on the average, 4.9%, fat by 6%, fiber by 10.7%. At the same time, there is an increase in the absorption of minerals by 7.3% and nitrogen by 9.3% [38].

3. Results.
The results of the experiment on the rehabilitation of rooms are shown in table 1.

| Indicator                              | Original air        | Processed air       |
|----------------------------------------|---------------------|---------------------|
| Air temperature, °C                    | 22.16±0.18          | 21.94±0.24          |
| Relative humidity, %                   | 78.64±0.16          | 71.12±0.014*        |
| Air speed, m/s                         | 0.19±0.01           | 0.20±0.01           |
| Concentration:                         |                     |                     |
| ammonia, mg/m3                         | 7.92±0.04           | 6.12±0.02**         |
| hydrogen sulfide, mg/m3                | 3.44±0.06           | 2.33±0.08**         |
| carbon dioxide, %                      | 0.22±0.02           | 0.18±0.01           |
| Dust, mg/m3                            | 12.22±0.10          | 4.82±0.08**         |
| Microorganisms, t/m3                   | 62.72±0.22          | 33.28±0.19**        |

Note: * P<0.05; ** P<0.01
M - arithmetic mean value;
m - mean square error

The presented data indicate that sanitation for 6 days, with 3-hour sessions of ozonation at a dose of 0.02 m3 of ozonated air per 1m3 of the purified air of the room using an ozonizer, significantly changed the quality of the microclimate for the better.

Thus, the relative humidity in the room for growing of goose growing stock decreased from 78.64 ± 0.16% to 71.12±0.14% (P<0.05), ammonia concentration - from 7.92±0.04 mg/m3 to 6.12±0.02 mg/m3 (P<0.01), hydrogen sulfide – from 3.44±0.06 mg/m3 to 2.33±0.08 mg/m3 (P<0.05), carbon dioxide – from 0.22±0.02 to 0.18±0.01% (P<0.05), dust – 39.44% (P<0.001), microorganisms - 53.06% (P<0.01).
The ozonizer did not have a noticeable effect on the temperature and speed of the air in the room. Egg production of geese is presented in Table 2.

**Table 2.** Data of egg productivity of geese using biologically active additives (average value per one goose for 1 month and only per season, in pieces).

| Period of a year | Group of geese | Control MD | 1 experimental MD+"Laricarvit" | 2 experimental MD+"Bacell" | 3 experimental MD+"Sporobacterin" |
|------------------|----------------|------------|-------------------------------|-------------------------------|------------------------------------|
| February         |                | 2.26       | 2.29                          | 2.35                          | 2.30                               |
| March            |                | 12.82      | 13.52                         | 13.74                         | 13.64                              |
| April            |                | 13.55      | 14.31                         | 14.50                         | 14.24                              |
| May              |                | 12.28      | 13.21                         | 13.28                         | 13.23                              |
| June             |                | 2.66       | 2.82                          | 2.88                          | 2.85                               |
| Total            |                | 43.57      | 46.15                         | 46.75                         | 46.26                              |

Note: MD - main diet

The egg production against the background of the use of "Laricarvit", a biologically active additive, in the ration, compared with the control analogues, during this period (February - June) was significantly higher, on the average, by 2.58 pcs./head in geese in the first experimental group, with the introduction of "Bacell", a biologically active additive, into a diet - by 3.18 pcs./head in the second experimental group of birds, with the use of "Sporobacterin", a biologically active additive - by 2.69 pcs./head, or by 5.92%, 7.29% (According to Table 2, P <0.01), 6.17% (P <0.01) in the third experimental group.

Hatching in the control group of eggs was 69.48%. This figure was characterized by 77.19%, 79.79%, 78.33% (P<0.01) in the experimental groups, against the background of the tested biologically active additives (Table 3).

**Table 3.** Indicators of egg incubation in "Universal", the incubation cabinets.

| Indicators of incubations | Control, MD | 1 experimental MD+"Laricarvit" | 2 experimental MD+"Bacell" | 3 experimental MD+"Sporobacterin" |
|---------------------------|-------------|-------------------------------|-----------------------------|-----------------------------------|
| Laid trays, pieces.       | 16          | 16                            | 16                          | 16                                |
| Number of eggs in the tray, psc. | 60         | 60                            | 60                          | 60                                |
| Total number of laid eggs. | 960         | 960                           | 960                         | 960                               |
| Of them fertilized, pcs.  | 799         | 820                           | 849                         | 830                               |
| in per cent               | 83.23       | 85.42                         | 88.44                       | 86.46                             |
| Hatching, heads           | 667         | 741                           | 766                         | 752                               |
| in percent                | 69.48       | 77.19                         | 79.79                       | 78.33                             |
| Hatchability, percent     | 85.62       | 90.36                         | 90.22                       | 90.60                             |

Note: MD - main diet

Hatchability compared with the control group of eggs was higher by 6.88%, 7.82%, 7.12% (P<0.01). This indicator in the second experimental group of birds, compared with the first and third groups was higher by 0.94% and 0.70%.

Bactericidal, lysozyme and phagocytic activity were determined in serum (Table 4) as indicators of nonspecific resistance against the background of the use of these biologically active additives in goosling.

The analysis of the numerical values of Table 4 shows that the activation of factors of nonspecific resistance of blood serum of gooslings was observed against the background of the use of biologically active additives. Growth of bactericidal activity amounted to 6.74%, lysozyme activity of 5.79%, phagocytic activity of 5.94% (as per table 4, P<0.05) in the first experimental group of birds, in applying
the "Lari
carvit", in relation to the control. In the second experimental group of birds, where «Bacell»
was used in the diet, a significant increase in the indicated indices of nonspecific blood serum resistance
of goslings was 6.87%, 5.93%, 6.10% (according to table 4 P <0.05). In the third experimental group of
birds, against the background of the use of «Sporobacterin», the growth of these indicators was 8.31%,
6.72%, 6.96% (according to table 4 P <0.01).

Table 4. Indicators of nonspecific resistance of blood serum of goslings in the application of dietary
supplements (M±m).

| Indicator                          | Control without additives | 1 experimental "Laricarvit" | 2 experimental "Bacell" | 3 experimental "Sporobacterin" |
|------------------------------------|---------------------------|----------------------------|------------------------|-------------------------------|
| Bactericidal activity, %           |                           |                            |                        |                               |
| at the beginning of the experiment | 44.62±0.82                | 43.91±0.78                 | 44.36±0.80             | 43.89±0.76                    |
| at the end of the experiment       | 46.57±1.06                | 49.71±1.10**               | 49.77±1.21**           | 49.90±1.26**                  |
| Lysozyme activity, %               |                           |                            |                        |                               |
| at the beginning of the experiment | 32.10±0.65                | 31.96±0.58                 | 31.82±0.52             | 32.14±0.68                    |
| at the end of the experiment       | 34.18±0.72                | 36.16±0.76*                | 36.21±0.81*            | 36.48±0.93**                  |
| Phagocytic activity, %             |                           |                            |                        |                               |
| at the beginning of the experiment | 48.07±0.85                | 47.83±0.79                 | 48.16±0.86             | 47.97±0.91                    |
| at the end of the experiment       | 51.12±1.08                | 54.16±1.12**               | 54.24±1.34**           | 54.68±1.31**                  |

Note: * P<0.05; **P<0.01.
M - arithmetic mean value; m - mean square error

Table 5. Indicators of the safety of geese in the biologically active additives.

| Indicator                        | Control (MD) | 1 experimental MD+"Laricarvit" | 2 experimental MD+ «Bacell» | 3 experimental MD+"Sporobacterin" |
|----------------------------------|--------------|-------------------------------|-----------------------------|-----------------------------------|
| Number of birds in the experiment | 120          | 120                           | 120                         | 120                               |
| Mortality of birds: heads %      | 6.00         | 4.00                          | 4.00                        | 3.00                              |
| The survival rate of birds, heads % | 5.00    | 3.33                          | 3.33                        | 2.5                               |
| The survival rate of birds, heads % | 114        | 116                           | 116                         | 117                               |

Note: MD - main diet

The analysis of this indicator during the whole period of the experimental work showed that the
introduction of these biologically active additives into the main diet of young geese has a positive effect
on the viability of geese, this is evidenced by the increase in the safety of geese in the experimental
groups against the background of the use of biologically active additives (table 5).
During the experiment in the control group where these biologically active additives were not used, 6 out of 120 goslings died from diseases of the gastrointestinal tract of non-infectious etiology, which is 5.00%, the viability of young birds in this group was 95.00%.

Survival rate was characterized by, the average, 96.67%, as compared with counterparts in the control, mortality decreased by, on the average, 2 heads, and birds' survival rate increased by 1.67% in the first and second experimental groups of goslings, against the background of the use of biologically active additives for the specified period. The survival rate of birds was 97.50%, compared to the control it was higher by, on the average, 2.50% in the third experimental group, when "Sporobacterin" was used in the diet.

The number of red blood cells in the goslings of the control group by the age of 15 days decreased from $2.19 \pm 0.14$ to $2.10 \pm 0.12 \times 10^{12}/l$, in the first experimental group - from $2.30 \pm 0.18$ to $2.20 \pm 0.13\times10^{12}/l$, in the third experimental group - from $2.29 \pm 0.15$ to $2.18 \pm 0.12\times10^{12}/l$, or 4.11%, 4.37%, 4.35%, 4.81%. By the age of 30 days, this figure in these groups decreased by 3.66%, 3.50%, 3.48%, 3.94%. At the same time, a regular and reliable increase in the number of red blood cells in the blood of experienced goslings is clearly observed, compared with control analogues, depending on the use of biologically active additives. So, in the blood in birds of the first experimental group, in relation to control analogues, a significant increase in this indicator by 15 days of the experiment averaged 4.28% (P <0.05), in the second experimental group - 4.76% (P <0.05), in the third experimental group of birds - 3.81% (P <0.05), and by the 30th day of the experiment this growth averaged 4.73% (P <0.05), 5.21% (P <0.05), 4.26% (P <0.05), respectively.

The number of white blood cells in the blood of geese, both in the control and in the experimental groups also gradually decreased with the growth of birds. At the same time, there is a slight increase in their number against the background of the use of these tested additives, however, without statistical reliability.

At the beginning of the experiment, the level of hemoglobin in the blood of the control and experimental geese had no significant differences and ranged from 108.04±1.89 g/l to 108.89±2.18 g/l. By the 15th day of the experiment, the level of hemoglobin in the experimental goslings compared to the control analogues, on the background of the use of biologically active additives in the first experimental group was higher on average by 5.49%, in the second - by 6.17%, the third - by 5.61%. On the 30th day of the experiment, these indicators were characterized by a change in the direction of growth: in the first experimental group of geese on the background of the use of "Laricarvit" by 6.11%, in the second - on the background of "Bacell" – by 6.95%, in the third - when using "Sporobacterin" – by 6.67%, respectively.

The total protein content in blood serum was slightly higher in geese of experimental groups against the background of the use "Sporobacterin", the biologically active additive. So, this indicator in the first experimental group of birds, compared with the control analogs, was significantly higher by 6.43, 5.83, 6.05%, in the second experimental group - by 7.94, 8.07, 6.91%, in the third experimental group - by 6.54, 6.19, 6.18% respectively.

Studies have shown that the level of γ-globulins in the serum of the experienced goslings significantly exceeded the analogous indicator of the control group of birds, compared with the control analogues, against the background of the use of the tested biologically active additives. Thus, this value was higher, on the average, by 9.27, 9.53, 10.09 % (P<0.01) in the blood serum of the first experimental group of geese, compared with intact poultry on 14, 28, 56th day of the experiment, by 9.69, 10.33, 12.30% (P<0.01) was in the second experimental group, by 9.86, 11.32% (P<0.01) in the third experimental group.

Among the important indicators characterizing the growth and development of geese is the average daily increase in their body weight (table 6). Daily weight gain exceeded that of control analogues by 6.00% - 6.24% (P<0.01) in the goslings of the first experimental group in 10, 20, 30, 40 - day of the experiment with application of the "Laricarvit" average. More intensive growth of this indicator occurred on 50-th, 60-th, 75-th days of the experiment in birds of this experimental group, against the background of the use of this biologically active additives.
active additive. So, the figure in this group of birds compared to the control, was greater, on the average, by 6.45 to 7.50% (P<0.01) within the time frame of work. This value in the gooslings was higher by 7.18, - 7.51% (P <0, 01) on 10, 20, 30, 40 days of the experiment, compared to the control, by 6.99-7.88% (P <0.01) on the 50th, 60th, 75th days of the experiment in the second experimental group, with the introduction of "Bacell" in the main diet.

Table 6. Dynamics of the average daily increase in body weight of geese when using biologically active additives, g (M±m).

| Age, day | Control MD | 1 experimental MD+"Laricarvit" | 2 experimental MD+"Bacell" | 3 experimental MD+"Sporobacterin" |
|---------|------------|-------------------------------|---------------------------|----------------------------------|
| 10      | 32.14±0.50 | 34.07±0.46*                   | 34.45±0.55**              | 34.16±0.46*                      |
| 20      | 41.96±0.51 | 44.50±0.62*                   | 44.94±0.66**              | 44.52±0.62*                      |
| 30      | 71.12±0.67 | 75.03±0.74**                  | 76.09±0.72**              | 75.53±0.74**                     |
| 40      | 73.70±1.05 | 78.30±1.14**                  | 79.24±0.91**              | 78.23±1.14**                     |
| 50      | 70.81±1.22 | 75.38±1.10**                  | 75.76±1.33**              | 75.20±1.04**                     |
| 60      | 65.98±1.34 | 68.84±1.41**                  | 69.73±1.48**              | 69.00±1.12**                     |
| 75      | 64.80±1.30 | 69.66±1.69**                  | 69.91±1.64**              | 69.75±0.69*                      |

Note: * P<0.05; ** P<0.01; MD - main diet.
M – mean arithmetic value;
m – mean square error

The numerical data of the table 7 show that the highest pre-slaughter weight of geese was in the experimental groups. This value in these groups of birds, compared with the control, was higher by 5.12%, 6.0%, 5.44%, respectively (according to Table 7 P<0.05).

The presented table shows that the weight of the uneviscerated carcass exceeded the same figure in the control analogues by 6.01%, 6.02%, 5.45% (P<0.01) in the experimental groups of geese. The yield
of the mass exceeded the same indicator in the control by on the average 5.87%, 6.92%, 6.21% (P<0.01) in the viscerated form in the geese of the experimental groups. The moisture content in the meat of gooslings of the first experimental group was less by 1.14%, compared with the control, by 1.18% in the second experimental group, by 1.24% (P<0.05) in the third experimental group, while the amount of crude protein, on the contrary, was more by 1.07%, 1.21%, 1.26% (P<0.05).

The content of dry substances in the samples of meat of the experimental groups, in relation to the intact group of birds, against the background of the tested biologically active additives was also higher, compared with the control analogues, by 1.14%, 1.18%, 1.24% (p<0.05).

The cost of the additional gross gain in body weight of gooslings were equal 6516.00 RUB, 7614.00 RUB, RUB 6678.00, respectively, at the sales price of 200.0 rubles per kg, in these experimental groups of gooslings.

The profit minus all expenses in the first experimental group of gooslings amounted to 5316.00 rubles, 6494.00 rubles in the second group and 5498.00 rubles in the third group. The conditional profit from one goosling in the first experimental group was 44.30 RUB, 54.11 RUB was in the second group, 45.81 in the third group, as result of the application of biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" at growing of goose growing stock. Based on each ruble spent, when using biologically active additives, net profit was 4.44 rubles in the first experimental group, 5.79 rubles in the second experimental group and 4.66 rubles in the third experimental group.

Thus, the tested domestic biologically active additives not only contributed to the improvement of physiological, morphological, biochemical, qualitative indicators of poultry meat but also to the increase in the live weight of geese and allowed to get additional profit.

4. Discussions
The results of the study showed that the egg production was increased, on the average, by 5.92%, 7.29%, 6.17% (P <0.01) in the goose of the experimental groups, compared with the use of dietary supplements "Laricarvit", "Bacell" and "Sporobacterin" compared to their analogues in the control for February - June. The highest egg production was in the second experimental group of geese, where "Bacell", the biologically active additive, was included into the main diet, within 7.29% (P<0.01) among these experimental groups of birds, compared with intact birds.

As you know, the output of goose growing stock is determined by the number of hatched viable healthy gooslings, expressed as a percentage of the number of eggs laid in the incubator. The results showed that this indicator was significantly higher by 7.71, 10.31, 8.85 (P <0.01) percent in the experimental batches, as compared with the control batch.

Further studies have shown that 667 viable healthy gooslings were obtained from fertilized eggs in the control batch, the hatchability in this batch (the percentage of hatched geese from the number of fertilized eggs) was 85.62%. In the first experimental group, this indicator relative to the control analogues was significantly higher by 4.74% (P<0.01), in the second – by 4.60% (P<0.01), in the third experimental group – by 4.98% (P<0.01), respectively.

An increase in the bactericidal activity of blood serum was observed in the first experimental group of birds by 6.74% (P <0.01), lysozyme activity - by 5.79% (P <0.05), phagocytic activity - by 5.94% (P<0.01) against the background of the use of "Laricarvit". The increase in these indicators of nonspecific resistance of the blood serum of geese was 6.87% (P<0.01), 5.93% (P<0.05), 6.10% (P<0.01) in the second experimental group, where the biologically active additive "Bacell" was used. The growth of marked components of nonspecific resistance of the blood serum of gooslings in relation to the intact poultry was, on the average, 7.15% (P<0.01), 6.73% (P<0.01), 6.96% (P<0.01) in the third experimental group on the background of the application of "Sporobacterin".

As you know, total protein is one of the most stable biochemical parameters. The total protein content in the blood serum was slightly higher than that of the control bird in our studies when using biologically active additives in the diet of experimental birds. This indicator was significantly higher, on the average, by 6.05-8.07% (P<0.01) on the 14th, 28th, 56th days of the experiment in blood serum of the experimental geese, in relation to the control.
Albumin fraction of protein is used in the body goose growing stock for the synthesis of tissue proteins. The results of studies showed that the level of this protein fraction in the blood serum of experimental geese, compared with intact poultry, was slightly higher, in the range of 2.97 - 3.65% (P<0.5), but the biometric analysis of these values was not statistically reliable.

A regular increase in the serum of the experienced gooslings was established, compared with the intact bird, the gamma - globulin fraction of the protein, was within 9.27% - 12.30% (P <0.01) against the background of the use of tested biologically active additives. These figures indicate that the tested biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" contributed to the stimulation of the Central organs of the immune system of geese to some extent, as gamma globulins are carriers of immune bodies [3].

The preparations used contributed to a significant increase in serum bactericidal activity by 6.74% (P<0.01), lysozyme activity – by 5.79% (P<0.05), phagocytic activity – by 5.94% (P<0.01). The increase in these indicators of nonspecific resistance of the blood serum of geese was 6.87% (P<0.01), 5.93% (P<0.05), 6.10% (P<0.01) in the second experimental group, where the biologically active additive "Bacell" was used. The growth of marked components of nonspecific resistance of the blood serum of gooslings in relation to the intact poultry was, on the average, 7.15% (P<0.01), 6.73% (P<0.01), 6.96% (P<0.01) in the third experimental group on the background of the application of "Sporobacterin", survival rate was higher by 3.67 - 5.50% (P<0.05) in the experimental groups of birds.

Studies conducted and the data obtained allow us to state that the tested biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" help to stimulate the egg production of goose, increase the percentage of hatching and hatching of goose eggs, erythrocytes, hemoglobin, non-specific resistance and obtaining healthy, viable gooslings.

As you know, the growth rate of geese is characterized by indicators of the average daily growth of their body weight. The increase in body weight of birds both in the control and in the experimental groups occurred according to the same pattern - as they grew. The growth of geese was more intense at the same time in the experimental groups. So, the average daily gain in body weight exceeded the same indicator of the intact group on the 10th, 20th, 30th, 40th days of the gooslings of the experimental group of scientific and economic experiment by, on the average, 6.00 - 6.24% (P<0.05), by 6.45 - 7.50% (P <0.01) on the 50th, 60th, 75th days in the first experimental group, when using "Laricarvit", the biologically active additive.

A similar change in body weight of the gooslings was observed in the second experimental group of gooslings, where "Bacell", the biologically active additive was introduced into their diet. The average daily weight gain of gooslings was, on the average, 64.80±1.30 g in the control group at the end of the scientific and economic experiment. This indicator exceeded the same indicator of the intact group by, on the average, 7.88% (P<0.01) in the second experimental group of birds.

The experimental work performed showed that "Sporobacterin", the biologically active probiotic additive liquid, also has a fairly high growth-stimulating effect at the completion phase of the experiment against the background of the use of this preparation in the diet of the average daily increase in body weight of gooslings in the third experimental group of birds, on the average, was 69.75 g, which exceeds the same indicator in the control by 7.63% (P<0.01%).

From the presented analysis, it can be concluded that "Bacell", the biologically active additive, causes the highest growth-promoting effect on growing gooslings of the three tested biologically active additives, which contains the microbial mass of the spore-forming bacteria Bacillus subtilis 945 (B-5225), acidophilic bacteria Lactobacillus acidophilus L917 (B-4625), Ruminococcus albus 37 (B-4292), sunflower meal, beet molasses, nonfat milk and water in its composition. This indicator was higher by, on the average, 7.88% (P<0.01) in the group of gooslings, where "Bacell" was used, in relation to the control.

The chemical composition of meat in gooslings of experimental groups on separate indicators slightly differed from those of the control group. Thus, the moisture content in the meat of gooslings of experimental groups, compared with control analogues, was less by 1.14-1.24% (P<0.05), the raw protein was, on the contrary, was more by 1.07 - 1.26% (P<0.05). The content of crude fat and ash in
samples of meat of experimental and control gooslings were, approximately, identical and had no reliable difference. At the same time, the dry matter content was higher by, on the average, 1.14-1.24% (P<0.05) in the samples of gooslings' meat of the experimental groups, compared with those analogues of the control group.

5. Conclusion
Three-hour ozonation sessions at a dose of 0.02 m3 of ozonated air per 1 m3 of purified air improved the sanitary and hygienic condition and optimization of the microclimate in the room for growing s for 6 days. The content of the relative humidity of the air in the room is reduced by 8.52% (P <0.05), the concentration of ammonia - by 22.73% (P <0.01), hydrogen sulfide - by 32.27% (P <0.001), carbon dioxide - by 0.10% (P <0.05), dust - by 60.56% (P <0.001), microorganisms - by 46.34% (P <0.001). The egg production for the average goose in the experimental groups, with the introduction of the dietary supplements "Laricarvit", "Bacell" and "Sporobacterin" in the main ration, was 5.92, 7.29, 6.17% higher (P <0.01), output of gooslings - by 4.59, 6.67, 5.73% (P <0.05), hatchability - by 8.32, 9.07, 7.98% (P <0.01), than in the control.

The increase in the blood content of the number of erythrocytes by 4.73 - 5.21 (P <0.05), leukocytes - by 2.91 - 2.95%, hemoglobin - by 6.11 - 6.95% (P <0.05), the level of total protein in blood serum - by 5.83% - 6.19% (P <0.01), gamma globulins - by 9.27 - 12.30% (P <0.01) under the influence of biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" on the 30th day of the experiment occurred within the physiological norm.

6. Summary
1. The bactericidal activity of the blood serum increases by 6.74 - 7.15% (P <0.01), lysozyme activity increases by 5.74 - 6.75% (P <0.01), phagocytic activity - by 5.99 - 6.96% (P <0.01), which indicates the activation of nonspecific resistance in the body of birds, as evidenced by an increase in survival rate of gooslings at 1.67 - 2.50% against the background of the use of "Laricarvit", "Bacell" and "Sporobacterin" as part of the main diet.
2. The use of biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" stimulates the growth and development of goose growing stock. The average daily gain of body weight of geese was higher by an average of 7.50 - 7.88 (P<0.01) in the phase of completion of the experiment in the experimental groups of birds, compared with the control. Higher growth of this indicator was noted in the group of gooslings, where "Bacell" biologically active additive was introduced into the main diet - 7.88% (P <0.01).
3. The use of biologically active additives "Laricarvit", "Bacell" and "Sporobacterin" increases the pre-slaughter weight of gooslings by 5.13 – 6.47% (P<0.05), the weight of the viscerated carcass - by 6.83-7.64 % (P<0.01). These figures were higher in the experimental group of gooslings, where "Bacell" was introduced to the main diet of gooslings.
4. Organoleptic and biochemical parameters of meat of experienced geese were identical with those of the control group and met the requirements of SanPiN 2.3.2.1078-01 "Hygienic Requirements for Safety and Nutritional Value of Food Products". The amount of moisture in the meat of the goosling of the experimental groups was less by 1.14 - 1.24% (P<0.05), the content of crude protein was by 1.07 - 1.26% more (P <0.05), dry matter was by 1.14 - 1.24% (P <0.05) than in the control group of gooslings.
5. Enrichment of the diet of gooslings with biologically active additives “Laricarvit”, “Bacell” and “Sporobacterin” contributes to obtaining additional profit in the domestic economy, based on each spent ruble 4.44 - 5.79 rubles, respectively.

7. Recommendations
1. We recommend using an artificial ozonizer brand "Pozitron-3 Air 1", with sanitation for six days, daily three-hour sessions at a dose of 0.02 m3 of ozonated air per 1 m3 of purified air, when growing gooslings to improve the microclimate of the rooms.
2. We recommend to enter into the diet biologically active additives "Laricarvit" at the rate of 3 kg/t, "Bacell" 2 kg/t feed and "Sporobacterin" at a dose of 1 ml per 100 kg of dose weight of birds to increase the egg production of geese, hatching of healthy goslings.

3. We recommend to introduce the dietary supplements "Laricarvit" into the goslings at the rate of 2.5 kg/t, "Bacell" - 1.5 kg/t of feed, "Sporobacterin" in a dose of 0.5 ml per 100 kg of body weight of birds to increase the intensity of growth, meat productivity, natural resistance, survival rate, quality of meat.

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