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Effectiveness of Vitaprem and Probiotic Bio–3s in Group–Prophylaxis of Hens' Hypovitaminoses

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Abstract

This article describes the main reasons of hypovitaminosis in hens and the results of studying the effectiveness of vitamin–mineral premix and probiotics in prevention. The main causes of hypovitaminosis in egg–laying hens are alimentary factors, including the lack of retinol, tocopherol, cholecalciferol, ascorbic acid and inorganic phosphorus in the farm ration compared to the standard indicators. Based on the analysis of the experiment results, it was found that the use of complex of vitamins and minerals Vitaprem together with probiotics had a positive effect on the process of metabolism of vitamins and minerals in the body of egg–laying hens.

Keywords:*Hens;Hypovitaminosis;Retinol;Tocopherol;Hepatosis;Lysine;Methionine;Calcium;Phosphorus;Cholecalciferol; Lysozyme Activity; Phagocytic Activity; Monocalcium Phosphate; Probiotic Bio–3S*

Introduction//// The Relevance of the Research

Today, poultry farming is one of the fastest growing industries in the world. Poultry farming is an important branch of animal husbandry, which provides the opportunity to produce poultry meat, dietary meat products, eggs, feathers and fuzz. Therefore, increasing the number of poultry farms and using them rationally as well as increasing the egg productivity of hens is of great scientific and practical importance. In the etiology of non–infectious diseases of poultry, metabolic disorders occupy the main place, while more than 25% of their deaths are caused by hepatosis, 17% by avitaminosis and hypovitaminosis, 23% by diseases of the digestive system, and 10% by rickets [9].

Metabolic disorders, including hypovitaminosis, are often noted among laying hens, which, in most cases, are chronically hidden. The development of an effective solution to this problem is of great

importance in meeting the population's demand for eggs and dietary poultry meat as well as ensuring food safety.

In poultry farms, hypovitaminosis in hens is often widespread, causing great economic damage to farms due to a decrease in productivity and product quality, and an increase in production costs. Therefore, in the fight against this pathology, the further improvement and implementation of existing traditional treatment–prophylactic measures is one of the urgent problems [4].

According to the references, the lack of vitamins in hens causes a decrease in egg production by 10–15%, and a violation of the hatching quality of eggs. When there is a lack of vitamins of group B and D in the diet of poultry, jaundice peritonitis, salpingitis may occur and cause up to 55% of them to die. Absorption of calcium and phosphorus is impaired in vitamin D3 deficiency, while mineral metabolism disorder, productivity reduction, eggs with thin shells, and the development of osteoporosis are observed. [1, 2, 3, 5, 8].

The main reasons for the lack of retinol in the body of hens are divided into two, which are endogenous and exogenous causes. Endogenous causes of hypovitaminosis A are infectious and parasitic diseases, as well as gastrointestinal diseases. The exogenous causes of the disease are a decrease in its reserves in the body as a result of a lack of carotene and vitamins in food. Hypovitaminosis A in chicken (at 2 weeks) is caused by the lack of carotene and retinol in the egg yolk, and in older hens the disease is mainly caused by the lack of these substances in the diet [7,10, 11, 12].

The Purpose of the Study

Study of the etiology, symptoms, productivity indicators of hypovitaminosis in laying hens, morphobiochemical changes of blood and egg composition, development and implementation of highly effective group–prophylactic method.

The Place, Object and Methods of Research

Scientific research is carried out in the poultry farms belonging to "K. Eldor" farm of Pastdargom district of Samarkand region (1st farm), JSC "Samarkandparranda" of Samarkand district (2nd farm) and "Ak Saray" LLC of Shakhrisabz district of Kashkadarya region (3rd farm). For dispensary inspections, 50 heads were separated from 20–week–old hens of the Lohmann Brown–Classic breed of poultry farms as a standard, until they enter the egg and during the laying period up to 28 weeks. Clinical–physiological status, morphobiochemical and quality indicators of blood and eggs, egg productivity once a month and conditions of keeping and feeding hens were studied [11, 6].

Hemoglobin (hemoglobin–cyanide method), glucose (color reaction with ortho–toluidine), total protein in blood serum (Refractometric method), total calcium (V.P. Vichev, L.V. Karakashov method), inorganic phosphorus in blood samples taken from hens (V.F. Kromyslov and L.A. Kudryavtseva method by pulse), retinol (Besseya method, A. Anisova modification), tocopherol (by chromatography method), ascorbic acid (by I.P. Kondrakhin method), carotenoids in egg yolk and retinol quantities were determined (spectrophotometrically). Quality indicators of eggs in hens were determined by organoleptic method, whereas body weight of hens and weight of egg samples obtained from them were determined using an electronic scale FEJ–1000B (Japan) [4].

This article describes etiopathogenesis of hypovitaminosis of laying hens and disease prevention which is devoted to the group–prophylactic tools of clinic and hematological indicators in hens, and effects to the egg production. Used vitamin–mineral premixes normalize processes of metabolism in the organism of hens and provide the increase of egg production 13, 3–14,0% (percent). Moreover, in order to investigate the effects of vitamin and mineral nutritional compounds on the productivity and organism of hens 4 groups of 50 hens were formed. Conservation conditions of the hens in the groups and the compound of ration are a feed on the same granular feeds. In the endogenous causes of Hypovitaminosis

A influenza and parasitic diseases and digestive tract infections slow down the absorption of vitamins A and carotene in the intestines. Although the patient the experimental part of scientific researches is completed during the 2017–2018 years in the condition of poultry farms of Samarkand region [13].

This article describes the main causes of hypovitaminosis in laying hens, the analysis of clinical and hemomorphobichemical parameters, as well as the results of group-prophylactic treatment. When the amounts of retinol and carotenoids in the egg yolk in the egg samples obtained from the hens in the experimental group were examined, the hens in the experimental and control groups showed almost the same indicators at the beginning of the experiments [14].

A number of research works are devoted to the study of foot joint pathologies, their diagnosis and prevention. However, many issues of the etiopathogenesis of joint diseases in horses, as well as modern methods of diagnosis, are still not well studied. A number of research works are devoted to the study of foot joint pathologies, their diagnosis and prevention. However, many issues of the etiopathogenesis of joint diseases in horses, as well as modern methods of diagnosis, are still not well studied [15].

The linear dimensions and absolute values of the veight of the humerus in the postnatal ontogenesis of rabbits of the gray giant, vhite giant and flander breeds were studied [17]. Lysozyme activity in blood serum was determined by nephelometric method (Dorofeychuk V.G., 1968), phagocytic activity – by counting phagocytic neutrophils in 100 cells, bactericidal activity – by I.M. Karput (1993).

Scientific and farm experiments were conducted to develop effective methods of prevention of hypovitaminosis in hens, to select preventive means and to study their effect on their organism, and to determine the economic efficiency of group preventive measures.

The Obtained Results and Their Analysis

According to the analysis of the food rations of hens in poultry farms, in the 1st farm, 32% of the ration is wheat grain, 22.85% is corn grain, 18% is soybean meal, 11.34% is sunflower meal, 2.26% is vegetable oil, 0.65% is monocalcium phosphate, 10.4% is limestone, and 2.5% is premix. The total nutrient content of 100 g of soft feed consisted of 264.0 kcal of metabolic energy, 16% of crude protein, 5.1% of fiber, 0.70% of lysine, 0.30% of methionine, 0.42% of threonine, 3.1% of calcium, 0.64% of phosphorus.

In comparison to the feeding norms, it was found that the diet of hens lacked metabolic energy by 26 kcal, calcium by 0.5%, phosphorus by 0.06%, retinol by 300 IU, cholecalciferol by 80 IU, tocopherol by 0.2 mg, ascorbic acid by 0.5 mg. In the diet of hens of the 2nd farm, compared to the standards, it was found that calcium lacked by 3.3%, metabolic energy by 6 kcal, crude protein by 0.2%, phosphorus by 14.3%, retinol by 315 IU, cholecalciferol by 83 IU, tocopherol by 0.15 mg, ascorbic acid by 0.2 mg. The metabolic energy of the ration of hens in the 3rd farm is 270 kcal, while it consists of 16.5% of crude protein, 5.2% of fiber, 0.72% of lysine, 0.31% of methionine, 3.0% of calcium, and 0.68% of phosphorus. Vitamin A constituted 690 IU, vitamin D3 – 115 IU, vitamin E – 0.85 mg, and ascorbic acid – 4.6 mg. Unbalanced diet of hens, lack of amounts of retinol, cholecalciferol, tocopherol, choline chloride (V4) in the diet causes hypovitaminosis in hens.

According to the results of clinical tests in hens (the 1st farm), 40–45% of hens showed general weakness, whiteness of the crown and ears, hypodynamia, decreased appetite, stunted growth, emaciation, decreased productivity, and feathering, whereas 12–16% of hens had serous catarrhal discharge from the nostrils, and clinical signs typical of retinol deficiency were observed, such as feather loss, appearance of thickened areas on the skin of the eyes, ears, soles of the feet.

According to the results of clinical examination, in the 2nd and 3rd farms where the experiments were carried out, during the period of increased egg production (weeks 26–28), general weakness, decreased appetite, white crowns, increased feathers, and decreased productivity were observed in hens,

whereas some of them demonstrated signs characteristic of retinol and calciferol deficiencies such long sitting.

By the end of the examination (week 28) compared to the indicators at the beginning of the examination (week 20), the features of the egg–laying hens of the "K. Eldor" farm (the 1st farm) were that the hemoglobin content was decreased by 12.1 g/l on average, the total calcium by 0.33 mmol/l, inorganic phosphorus by 0.02 mmol/l, glucose by 0.22 mmol/l, retinol by 0.12 μmol/l, tocopherol by 0.1 μmol/l and ascorbic acid to 0.5 μmol/l (R<0.05), which indicates that the biochemical indicators of blood decrease during the egg–laying process in hens.

The amount of retinol, tocopherol and vitamin C in the blood serum of hens was observed to decrease during the first two months (weeks 20–28) of the laying period of hens, and by the end of the investigation period, compared to the initial indicators (week 20), the average of retinol decreased by 0.11 μmol/l, tocopherol by 0.14 μmol/l and ascorbic acid by 0.9 μmol/l.

The amount of hemoglobin in the blood of hens belonging to JSC "Samarkandparranda" was 102.6±1.6 g/l on average in the 20th week, 98.5±2.4 g/l in the 24th week, which decreased to 92.6±2.8 g/l in the 28th week. This condition indicates that hypovitaminosis in hens is accompanied by anemia.

It was found that the amount of inorganic phosphorus decreased by 0.16 mmol/l, total calcium by 0.04 mmol/l, and glucose by 0.10 mmol/l by the end of the examination compared to the values at the beginning of the tests (Fig. 1). The blood parameters of Lomann Brown–Classic egg–laying hens in the egg department of the poultry farm belonging to "Ak Saray" LLC compared to the indicators at the beginning of the tests (week 20) and by the end of the tests (week 28), the average amount of hemoglobin decreased from 92.6±3.4 g/l to 86.4±3.5g/l, total calcium – from 2.98±0.28 mmol/l to 2.74±0.24 mmol/l, inorganic phosphorus – from 2.40±0.32 mmol/l to 2.32±0.32 mmol/l, glucose – from 5.50±0.42 mmol/l to 5.27±0.38 mmol/l, retinol – from 0.72±0.02 μmol/l to 0.60±0.05 μmol/l, tocopherol – from 0.66±0.05 μmol/l to 0.50±0.05 μmol/l and ascorbic acid – from 6.8±1.34 μmol/l to 5.8±1.32 μmol/l (R<0.05).

The body weight of hens at the age of 20 weeks was on average 1576±15 g in the 1st farm, 1586±16 g in the 2nd farm, and 1594±11 g in the 3rd farm, whereas by the end of the examination (week 28) it was 1740±15 g, 1742±18 g and 1738±15 g respectively. Taken into account that the body weight of Lohmann Brown–Classic hens in the 28th week was 1815–2006 g on average, it was found that the average body weigth of hens in the 1st farm was less for 75 g, in the 2nd farm – less for 73 g, and in the 3rd farm – less for 77 g (Table 1).

The mass of eggs obtained from hens in the 1st week of the laying period was 46.5 g on average in the 1st farm, 47.2 g in the 2nd farm, and 46.6 g in the 3rd farm, whereas by the 28th week it constituted 57.6 g, 58.3 g and 58.2 g respectively, which shows that the mass of eggs increased by 11.1 g in the 1st farm, 10.9 g in the 2nd farm, and 11.2 g in the 3rd farm during 8 weeks. These indicators are much lower than the standard indicators for this breed of hen (12.8–13.0 g).

Table 1, Productivity indicators of hens (weeks 24–28) (n=50)

Farm name	Examination time	Hen body weight, g	Egg mass, g
"K. Eldor"	20th week	1576±15	46,5±0,45
	24th week	1684±17	54,8±0,82
	28th week	1740±15	57,6±0,58
"Samarkandparranda" JSC	20th week	1586±16	47,2±0,92
	24th week	1710±15	55,4±0,54
	28th week	1742±18	58,1±0,59
"Ak Saray" LLC	20th week	1594±11	46,6±0,85
	24th week	1696±13	55,6±0,62
	28th week	1738±15	58,2±0,5

During the experiments on prevention of hypovitaminosis in hens, 30 heads of 45–46–week–old Lomann Brown–Classic breed hens were taken from JSC "Samarkandparranda", which formed 3 groups of 10 heads each. The conditions of keeping the birds were the same, while the hens in the control group were fed with the pelleted feed of the farm ration. Hens in the first experimental group were given granulated soft feed prepared by mixing vitaprem (vitamins) – 1 g/kg, vitaprem (minerals) – 1 g/kg, monocalcium phosphate – 12 g/kg, in addition to farm ration. The hens of the second experimental group were fed soft feed in the form of pellets adding vitaprem (vitamins) - 1 g/kg, vitaprem (minerals) – 1 g/kg, monocalcium phosphate – 12 g/kg, probiotic Bio–3S – 1 g/kg to the diet. The experiments lasted 60 days.

At the beginning of the experiments, 30–35% of hens in all groups showed clinical signs such as anemia, feather loss, and loss of appetite. At the end of the experiments, these clinical signs remained only in hens of the control group. At the beginning of the experiments, hemoglobin content in the control group, in the first and second experimental groups averaged 98.2±2.40 g/l, 102.0±1.20 g/l, and 99.8±1.22 g/l ($R < 0.05$) respectively. At the end of the experiments, it was noted that the amount of hemoglobin in the control group decreased by 1.7 g/l on average, while it increased by an average of 4.0 g/l in the first experimental group 1, and by 8.2 g/l in the second experimental group 2. At the end of the experiments it was noted that the total protein content in the serum of hens decreased to an average of 40.4±0.40 g/l in the control group, whereas it increased by to an average of 48.2±0.36 g/l in the first experimental group, and to an average of 52.5±0.32 g/l in the second experimental group. It was found that the amount of glucose in the blood of hens of the control group decreased by an average of 0.08 mmol/l at the end of the experiment compared to the initial indicators.

The amount of retinol in the egg yolk of the hens in the control group was on average 5.2±0.10 μg/g at the beginning of the experiments, and on average constituted 4.6±0.20 μg/g at the end of the experiments, which indicates that on average 0.6 μg/g ($R<0.05$) decrease was characteristic.

The amount of retinol in egg yolks increased from an average of 5.2±0.10 μg/g at the beginning of the experiments to 6.8±0.16 μg/g at the end of the experiments in the first experimental group, and from an average of 5.4±0.22 μg/g to 8.6±0.16 μg/g respectively in the second experimental group, carotenoid content correspondingly decreased from 12.6±0.20 μg/g to 10.6±0.20 μg/g in the control group, while increasing on average from 12.1±0.18 μg/g to 18.3±0.16 μg/g in the first experimental group, and on average from 12.4±0.20 μg/g to 24.2±0.18 μg/g ($R<0.05$) in the second experimental group.

According to the results of the analysis of the immunological status of the hens in the experiment, it was noted that the bactericidal, phagocytic and lysozyme activities in the blood serum of the experimental and control groups were almost similar to each other. During the experiments, bactericidal activity in blood serum increased by 4.17% and 4.86% in the first and the second experimental groups respectively, phagocytic activity increased by 2.7% and 6.14% in the first and the second experimental groups respectively, lysozyme activity increased by 2.16% and 3.06% in the first and the second experimental groups respectively, whereas in the control group bactericidal activity increased by 0.16%, phagocytic activity by 1.15%, and lysozyme activity by 0.1%.

At the beginning of the experiments, the average egg weight of the hens in the experimental and control groups constituted 56.8±5.06 g. By the end of the experiments, the average egg weight of the hens in the first and second experimental groups were on average 62.4±5.20 g and 66.5±6.46 g, whereas it averaged 58.6±6.04 g in control group hens.

Addition of vitaprem (vitamins) 1g/kg, vitaprem (minerals) 1g/kg, monocalcium phosphate 12g/kg, probiotic Bio–3S 1g/kg to the ration of egg–based hens has a positive effect on their body, improves their clinical and hematological indicators according the norms and increases resistance, providing the increase of the weight of hens by 7.9 grams on average and of the percentage of laying eggs by 18–20% compared to the control group.

At the beginning of the research, the egg weight of the hens in the experimental and control groups was almost the same, whereas by the end of the experiments, the egg weight of the hens in the experimental group and the control group were on average 60.3±5.50 g and 52.1±5.01 g respectively. Hens in the experimental group had an average body weight of 1548 g at the beginning of the experiments and 1852 g at the end of the experiments, while this indicator was an average of 1523 g and 1712 g in the control hens, respectively. It was found that the change in the body weight of experimental hens increased by an average of 140.0 g in the experimental group compared to the control group by the end of the experiments.

Conclusion

1. The provision of the enriched soft food in addition to the diet in the form of pellets prepared by adding 1 g/kg Vitaprem (vitamins), 1 g/kg Vitaprem (minerals), 12 g/kg monocalcium phosphate and 1 g/kg probiotic (Bio 3S) to hens from the laying period (week 20) has a positive effect on clinical–physiological and hematological indicators, and a high preventive effect against hypovitaminosis.

2. The provision of enriched soft feed in the form of pellets to hens compared to the control group increased the amount of hemoglobin in the blood by 19.6%, total protein in the blood serum by 26.1%, total calcium by 4.9%, inorganic phosphorus by 10.0%, retinol by 32.5 %, tocopherol by 10.7%, ascorbic acid by 13.3%, the amount of carotenoids in egg yolk by 23.4%, retinol by 8.3%.

3. The economic efficiency of feeding with granulated enriched soft feed prepared by adding 1 g/kg vitaprem (vitamins), 1 g/kg vitaprem (minerals), 12 g/kg monocalcium phosphate and 1 g/kg probiotic in addition to the ration of egg–based hens constitutes 6.5 UZS per 1 UZS cost.

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