

The use of an anxiolytic and vitamin C in the correction of technological stress in the rearing of broiler chickens

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Abstract. In modern broiler poultry farming, technological stress of poultry is an important factor in reducing productivity. Developing new methods for decreasing the effects of stress on the broilers is one of the important goal. In an experiment on broiler chickens, the stress-protective effect of hydroxyzine, ascorbic acid and their complex on clinical indicators and productive qualities was studied. It was found that the use of hydroxyzine and its complex with vitamin C increases the average daily weight gain by 20%. With an increase in stocking density by 1.5 times, the level of erythrocytes decreases in all groups, but the use of hydroxyzine prevents the development of erythropenia. An increase in stocking density changes the leukocyte formula of the blood, increasing the proportion of lymphocytes by 18%. The use of anxiolytics does not affect the ratio of lymphocytes and heterophils. A conclusion is made about the positive effect of hydroxyzine on metabolic processes in chickens grown under conditions of technological stress.

1 Introduction

Intensification of broiler poultry farming involves the usage of special poultry crosses that are highly productive but have reduced resistance to technological factors. The usage of automated systems in combination with high stocking density induces stress in the body of the broiler chicken, reducing productivity. Stress of any etiology leads to a violation of homeostatic indicators and can lead to excessive formation of free radicals, reducing the body's resistance to infectious diseases. As a result, the health of animals deteriorates, the survival rate of the livestock decreases, which leads to economic damage [1, 2, 3]. In order to prevent the negative impact of stress on productivity indicators in poultry farming, in addition to improving technological processes, various preventive methods are used, including the use of alimentary factors. Positive results are achieved by changing the proportion of fats and carbohydrates in the diet to regulate the ratio of effective and exchange energy [4, 5, 6].

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An active direction of alimentary anti-stress effects is the use of food antioxidants. The development of effective antioxidant solutions to reduce the negative effects of commercially significant stress is based on the possibilities of modulating genes responsible for the adaptation of birds to stress. By including betaine, carnitine, vitamins E and C, as well as some minerals, electrolytes and organic acids in water, it is possible to effectively combat various stresses. A drug that has a stress-protective effect and a positive effect on productivity is ascorbic acid, successfully used in industrial poultry farming, which helps optimize metabolic processes in the body of chickens by increasing natural resistance [7, 8]. To prevent excessive formation of free radicals, the use of antidepressants with different mechanisms of action is an effective way to reduce stress in veterinary and agricultural practice. First of all, antidepressants are widely used in clinical veterinary medicine to correct behavior in dogs and cats [10]. One of the available sedatives used in veterinary practice is hydroxyzine. Most often, hydroxyzine-based drugs are used as an antihistamine for severe allergic reactions in animals [9]. At the same time, having a pronounced anxiolytic effect, hydroxyzine, being a blocker of H1-histamine receptors, helps to suppress the activity of some zones located in the nuclei of the thalamus, which are responsible for the feeling of anxiety. In this regard, the aim of the experiment was to study the use of hydroxyzine, vitamin C and their complex on clinical blood parameters and productivity of broiler chickens when grown in conditions of high stocking density.

2 Materials and methods of research

The research was made in the educational and production poultry house of the Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev. The experiment was conducted on 75 broiler chickens of the Smena-9 cross. The duration was 36 days. The experiment consisted of two stages: preparatory and experimental. During the preparatory period (1-14 days), day-old broiler chickens were kept in a brooder and received BR-1 compound feed. In the second experimental period (15-38 days), the birds were divided into 5 groups using the analog method, with 15 heads in each group (Table 1).

Table 1. Scheme of the experiment.

Groups	Used drugs	Drug doses
1-control group (15 heads)	Basic ration (BR)	-
2-experimental (15 heads)	BR	-
3- experimental (15 heads)	BR +Ascorbic acid	30 mg / kg per day
4-experimental (15 heads)	BR + Hydroxyzine	5 mg / kg 2 times a day
5-experimental (15 heads)	BR + Ascorbic acid + Hydroxyzine	30 mg / kg per day + 5 mg / kg 2 times a day

The main diet consisted of BR-3 compound feed. The birds were kept on the floor in a box divided into 5 sections with sawdust bedding, nipple drinkers and bunker feeders. In the experimental groups, the active stress factor was the increased stocking density of the birds. For the control group, the stocking density was 20 kg of live weight/m², for the experimental groups - 30 kg/m². The stocking density was regulated using movable fences with daily consideration of the dynamics of live weight gain of the birds. The experimental groups received ascorbic acid together with water at a concentration of 200 mg/liter of water, and hydroxyzine in the form of the drug "Atarax" - together with compound feed at a dosage of 5 mg/kg of live weight of the birds twice a day.

3 Research results and discussion

As a result of the experiment it was established that as a result of the increase in the stocking density in the 2nd experimental group, despite the high weight gains from day 20 to day 25 (63-71 g), the most pronounced decrease in weight gain is noted on day 30 of the experiment, relative to the control group (Figure 1). The use of anti-stress drugs generally improved daily weight gains. In the group receiving ascorbic acid, an increase in daily weight gain by 1.5 times was recorded only on day 30, and at the end of growing chickens in the 3rd experimental group it did not change significantly. In the groups receiving hydroxyzine and its complex with ascorbic acid, daily weight gains from day 25 to day 35 exceeded these values in the control and 2nd experimental groups. The use of stress-protective drugs in groups 4 and 5 increased daily weight gain by 20% compared to the control group.

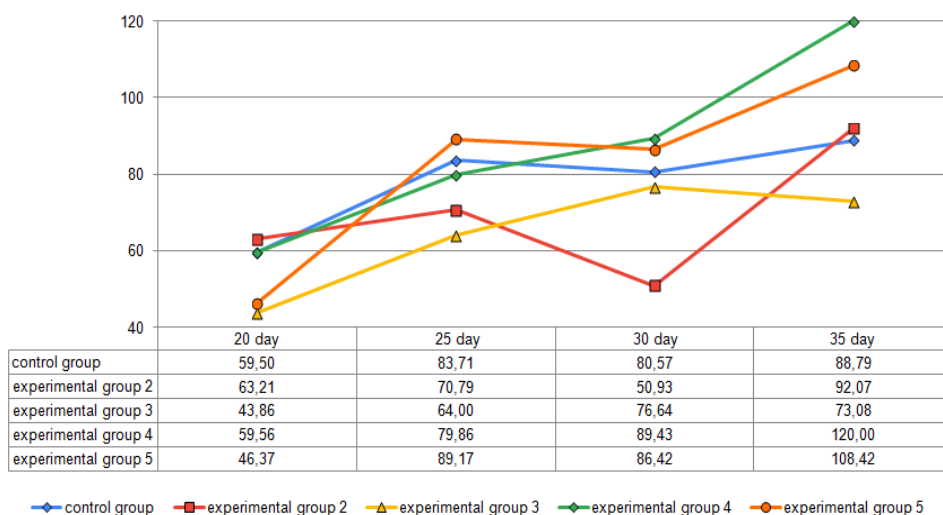


Fig. 1. Weight gain of broiler chickens (g)

Blood analysis of broiler chickens at the end of the experimental period showed that changes in the blood system were detected with an increase in stocking density. In experimental groups 2, 4 and 5, an increase in hematocrit by 15-16% was noted, due to functional stress in the vegetative and protective systems of the body (Table 2). At the same time, in all experimental groups, the number of erythrocytes decreased, which negatively affects the gas exchange function and can lead to hypoxia. With an increase in stocking density, despite an increase in hemoglobin concentration by 3.8% in chickens of the 2nd experimental group, the average concentration of respiratory pigment in the erythrocyte decreased by 12% with a simultaneous increase in cell volume by 2.5%, which is probably due to hydration of red blood cells with their subsequent cytolysis. The use of hydroxyzine and its complex with vitamin C reduced the effect of the stress factor, and the level of erythrocytes in the blood of chickens in groups 4 and 5 increased by 4% and 1.5% compared to group 2. The amount of hemoglobin and its average concentration also approached the background value in the control group, indicating normalization of erythrocyte function.

Table 2. Morphological blood composition of broiler chickens, day 35 (n=15).

	Control group	Experimental group 2	Experimental group 3	Experimental group 4	Experimental group 5
Hematocrit (%)	24.3±1.6	27.88±2.5	23.2±2.1	28.38±2.8	27.8±3.2
Red blood cells (x10 ¹² /l)	3.178±1.4	2.22±0.2	1.82±0.2	2.31±0.2	2.254±0.3
Hemoglobin (g / l)	133±7.4	138±13.9	137±11.2	132.2±3.2	130.6±5.5
Average concentration of HB in the red blood cell (%)	49.06±10.9	42.96±7.2	61.32±9	48.1±4.9	49.02±5.8
Average red blood cell volume (microns ³)	121.5±2	123.9±2.3	128.18±3	122.4±2.9	123.3±1.2

Analysis of the white blood cells revealed relative leukocytosis in poultry under the influence of the stress factor, as evidenced by an increase in the leukocyte level by 7% in the blood of chickens of the 2nd experimental group relative to the background value in the control group. The use of stress-protective drugs led to a decrease in the leukocyte level to control values.

Table 3. White blood cell count in broiler chickens, day 35 (n=15).

	Control group	Experimental group 2	Experimental group 3	Experimental group 4	Experimental group 5
Leukocytes (x10 ⁹ /l)	3.9±0.5	4.2±0.8	3.08±0.6	3.94±0.7	3.58±0.6
Eosinophils (%)	2.6±0.3	4.0±1.2	2.6±0.3	3.8±0.4	2.4±0.3
Monocytes (%)	1.2±0.2	1.4±0.3	1.2±0.2	1.2±0.2	1.4±0.3
Basophils (%)	0.8±0.2	0.8±0.2	1.0±0.4	1.0±0.4	0.8±0.2
Heterophiles (%)	60.4±3.6	40±8.3	41.6±7.0	37.8±3.8	44.8±5.0
Lymphocytes (%)	35.0±3.7	53.8±8.5	52.2±7.9	56.2±3.7	50.2±5.0

The leukocyte profile of the chickens in the 2nd experimental group changed towards a decrease in the number of heterophils by 20% and an increase in the proportion of lymphocytes by 18% and eosinophils by 2%, which ultimately led to a sharp increase in the lymphocyte index according to Shaganin from 0.58 to 1.35. Such signs indicate the development of significant tension in the stress reaction in the body of chickens by the end of the growing period, when the average daily weight gain is maximum. The use of an anxiolytic and its combination with vitamin C did not affect the leukocyte formula in general, and the lymphocyte index in chickens of groups 4 and 5 was 1.48 and 1.12, respectively. Consequently, the development of adaptation syndrome with an increase in stocking density has a significant effect on blood resistance indicators, which in general can lead to pathological development of the reaction.

4 Conclusion

The correct stocking density of broiler chickens is one of the main technological parameters that allows for the efficient use of production space and equipment, and also has a positive effect on the health and productivity of the bird. With an increase in this indicator by 1.5 times, the chickens during the period of intensive growth experience a decrease in daily weight gain, which is accompanied by an extreme stress reaction, accompanied by changes

in the blood system. A decrease in the level of lymphocytes as a result of neuroendocrine effects reduces the specific resistance of the bird's body during the period of maximum intensive growth. The use of ascorbic acid partially mobilizes anabolic activity on the 30th day of growing, but its further use does not ensure high growth intensity, while the hematological indices of red and white blood are reduced to a minimum. The use of hydroxyzine and its complex with ascorbic acid had a positive effect on daily weight gain, but the leukocyte profile did not change significantly, which indicates the continued extreme state of the chickens' organism, whose blood system is not fully formed and cannot ensure adaptation to stress. Thus, the positive effect of using an anxiolytic, due to the effect on the thalamic nuclei of the brain, affects the mechanisms of metabolism regulation due to the mobilization of the vegetative systems of broiler chickens.

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