Features of the functioning of stress systems of the animal body against the background of the use of a feed additive

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Abstract. This article contains information about the impact of cross-activating and stress-limiting environmental factors on the body of young calves, in particular, information about the physiological status and antioxidant system. The following indicators, catalase activity, malonic dialdehyde, as well as lipid peroxidation. At the same time, we assessed the adaptive capabilities of animals, against the background of the use of corrective fodder supplements, which contribute to the strengthening of stress activity - limiting systems of the body [1]. At the end of the research work, we will analyze the ability of the biovitel feed additive to affect the antioxidant system of the body of the subjects animals.

1. Introduction
In modern conditions in farming there is a trend of accelerating beef production through application of feed additives in this context there is a need to study adaptive abilities of the animal body with application of these additives. It is proved that any changes in the feeding and maintenance of cattle entail changes in the body itself, which is the adaptive response of the body to the changed conditions [2]. Our task is to study the mechanism of physiological adaptation, and find ways to accelerate this process. In view of the above, there is a need for studies aimed at identifying the physiological status of test gobies, the list of which includes an analysis of the physiological state of their body's antioxidant system, which in turn is fully capable of reflecting the ability of young gobies to adapt to the conditions of exposure to man-made environmental factors. This research work will make it possible to identify the correct recipes for adjusting the physiological status of subjects. Lack of information on this topic in the scientific literature gave us an impetus to study in this direction.

2. Materials and methods
For setting up the experiment, we selected the Hereford breed, namely 6-month-old bulls, divided into 2 groups of 10 individuals in each group, the 1st group served as the control of the second group. Subjects of both groups were kept in free-range pens. Feeding rations were identical except that the second group of subjects was given the Feed additive biovitel, the conditions of detention were also the same. The experiment was divided into 4 series in which we took samples.

Lipid peroxidation in organ tissues was studied by the method of J. Stocks et al. (1975) in the modification of I. A. Volchehorsky and his co-authors (1988). The degree of catalase activity was calculated by the method of N. L. Mamontov et al. (1994). Malondialdehyde-was established according to V. I. Orekhovich (1976). The degree of activity of superoxide dismutase was calculated by the method of S. A. Chevary and others (1986).
The obtained data were subjected to statistical processing with the calculation of the criterion of nonparametric statistics using the Mann-Whitney (U) method.

3. Results

Thus, we were able to conduct research aimed at studying the biochemical and morphological structure of the blood of the subjects. Blood sampling for tests was performed at 6, 7, 8 and 9 months of age. In the second group of subjects, we observed a decrease in the concentration of leukocytes by an average of 9.3% (P<0.05) in comparison with the control group of subjects at the age of 6 months. We also observed an increase in this indicator in the control group of subjects, whose values were 16.14% (P<0.01). The difference between the groups was 6.84%. This indicates that there are differences in the rate of growth and development between groups [3]. High concentration of white blood cells, more often manifested in animals with low growth rate. It is also worth noting that the tendency to increase the concentration of blood leukocytes in the subjects of the 1st group persisted in the future, so in comparison with the 6-month age in 7 months, this indicator was 16.57%, by 8 months 13.09% and only by 9 months there was a decrease to (1.09%). Based on the results obtained during statistical processing, we observe that this trend has not been confirmed. Red blood cells in the study period were in the range from 7.14±1,27x10¹⁵g/l in 6 months to 6.64±0,56x10¹⁵g/l – and so on until the end of the fattening period. In the second group, we observed the following values of this indicator: 7.34±0.51 x 1015 g/l at 6 months, then after reaching 9 months, 8.92±2.11 x 1015 g / l, the initial data differ by 7.15%. Thus, at the age of 7 months in the subjects of the 2nd group, observed a predominance in these indicators by an average of 6.12% (P<0.05), in comparison with the control group of subjects, after reaching 8 months of age, the difference in favor of the second group was 9.61% (P<0.01). All these data indicate that the feed additive biovitel had a positive effect on the redox system of the body of bulls [4].

An increase in the content of secondary forms of peroxidation - diene conjugates increases the water-repellent properties of fatty acids located on the surface of intercellular membranes [5]. There is a process in which hydrocarbon chains are displaced from the intercellular membranes, the polarity of which is significantly higher than the polarity of cell membranes, which in turn contributes to an increase in the rate of membrane renewal, changes occurring in the hydrophilic layer entail changes reflected in the throughput of cell membranes, as well as in the processes of ion transport in the cell [6]. To do this, we carried out a study of the dynamics of lipid peroxidation with the use of food additives of biovitel.

As a result of lipid peroxidation, products are formed that are concentrated in the isopropanol fraction, their content was 23% (p<0.001) lower in the liver, in the blood serum on average by 25 % (p<0.05), in the tissues of the heart muscle - by 18% (p<0.001) in comparison with the control group of subjects. In order to fully study the process of lipid peroxidation in the blood of the subjects, we calculated the concentration of malondialdehyde, which is a secondary product of lipid peroxidation [7].

This indicator in the blood serum of subjects who did not receive supplements at 7 months was increased by 14% (p<0.001), by 11% (p<0.001) in the liver, by 10% (p<0.001) in the tissues of the heart muscle [8]. In subjects who consumed biovitel for 30 days, the presence of malondialdehyde in blood serum was lower by 35% (p<0.01), by 29% (p<0.001) in heart muscle tissues, by 24% (p<0.05) in liver tissues. Similar indicators of malondialdehyde concentration in the above organs were recorded at 8 and 9 months of age in animals of the control group of subjects. Deactivation of catecholamines occurs through specific enzymes, in particular catechol-o-methyltransferase and monoamine oxidase [8], these enzymes are concentrated in the liver tissue. There is also a slowdown in the processes of deactivation of amines by monoamine oxidase, which can be used to increase useful indicators [9]. Thus, the rate of enzyme activity in heart muscle tissues was increased by 37% (p<0.01) in subjects whose diet included biovitel.

Indicators of the degree of monoamine oxidase activity were increased in bulls receiving the supplement at 7 months. by 41% (p<0.001) in liver tissues , 48% (p<0.001) in heart muscle tissues. In
bulls that did not receive a feed supplement, a decrease in the values for this indicator was observed in liver tissue - by 7% (p<0.05), in heart muscle tissues-by 11% (p<0.05). The degree of monoamine oxidase activity was higher by 19% (P<0.001) in the tissues of the heart muscle and by 13.8% (P<0.05) in the liver in bulls at 9 months who consumed a lump supplement with feed [10]. In the control group of subjects, we observed suppression of the activity of the monoamine oxidase enzyme. Through the process of oxidation of free radicals, cellular activity is regulated [11]. The course of this process is influenced by a number of factors, such as excess fat, inflammatory processes, stress, etc., in which the accumulation of free radicals occurs, which leads to an acceleration of the processes of lipid peroxidation [12].

When studying this issue, we studied such indicators as superoxide dismutase, tocopherol, and catalase. In 7 months, we observed an increase in the concentration of tocopherol by 2.59%, as well as a decrease in the values of the degree of activity of superoxide dismutase, catalase and glutathione reductase in bulls receiving the feed additive biovitel.

In the control group of bulls at 9 months, catalase was increased by 3.9%, the degree of glutathione reductase activity - by 5% (U) and superoxide dismutase by 11.45% (p<0.05). In calves receiving the feed additive, catalase was reduced by an average of 19% (p<0.01), glutathione reductase by 22% (p<0.01) and superoxide dismutase to 29% (p<0.01). Gobies receiving feed additives had a higher degree of enzyme activity [12]. From all of the above, it can be concluded that the manifestation of certain signs of adaptation is influenced by the degree of influence of stress-implementing and stress-limiting factors [13]. All these factors contribute to the development of inhibition of the process of free radical oxidation of lipids, through the antioxidant mechanisms of the body [14]. Based on the data obtained, changes in the concentration of serum albumin are caused by the action of a feed additive, which has a positive effect on enzyme activity, since albumins are involved in the regulation of these processes [15].

4. Discussion
If we talk about a deviation from the physiological norm, the variability of the biochemical and morphological composition of blood was comparable to age-related changes in the body. According to such indicators as hemoglobin, red blood cells, white blood cells, it is possible to characterize the dynamics of the development of the body, respectively, the group of animals in which these indicators at a higher level have a high growth rate. In the group of animals receiving the supplement, the concentration of glucose, as well as total lipids, were increased by 16.05% compared to the control. It is also worth noting that in the experimental group receiving the feed additive biovitel we observed high concentrations of potassium and phosphorus.

The territory of the Southern Urals is not an ecologically favorable region for farming, in the current conditions, the body of the subjects is constantly adversely affected by environmental factors, but at the same time we managed to accelerate the process of lipid peroxidation through the use of the feed additive biovitel [16].

In the control group of subjects, we observed the opposite trend, in which the facts of increasing the concentration of lipid peroxidation products in the blood serum, liver, and heart were revealed throughout the entire period of the experiment.

In the second series of experiments the control group was increased indicators malonic dialdehyde. Also, in animals of this group, the inhibition of the antioxidant system of the body was revealed. Thanks to these studies, we were able to fully study the effect of the feed additive biovitel on the lipid peroxidation of Hereford bulls in conditions of environmental distress, this additive showed a positive effect on the body of animals, as evidenced by the above data [17]. We managed to reduce the concentration of lipid peroxidation by an average of 21%.

5. Conclusion
The conducted studies and the obtained results indicate the effectiveness of the use of the biologically active additive biovitel to increase the development and growth of bulls. The study confirmed that
biovitel is able to reduce lipid peroxidation in the technology of fattening and rearing cattle in ecologically unfavorable areas of the Southern Urals.

In animals kept in ecologically unfavorable regions, there are violations in the metabolic processes of the body, but it is difficult to identify this without conducting special and very complex studies, and when clinical manifestations occur, it is no longer possible to change the situation in any way. While the intensity of lipid peroxidation processes occurs before the immune response and significantly increases the capabilities of the antioxidant system against the background of depletion of its main components, this fact is confirmed by the specifics of changes in the concentration of monoamine oxidase – the main antioxidant of plasma.

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