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"Glimalask-Vet" Feed Supplement For Reducing The Technological Stresses And Improving The Animal Welfare And Meat Quality In Beef Cattle Breeding.

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ABSTRACT

The research study has established that the "Glimalask-Vet" feed supplement has an anti-stress effect. The feed supplement (where Gli = glycine, mal = malic and asc = ascorbic acids and Vet for using in animal husbandry) in the diet of steers contributed to the faster restoration of their organisms. So, 5 days after the impact of the "formation of groups" stress factor, the body temperature of the steers in Control group increased by 0.3 °C, the analogs in Test groups 1, 2 and 3 by 0.1 °C, the respiratory rate increased by 2.3, 2.2, 0.5 and 0.8 times per minute and heart rate by 4.0, 2.0, 1.7 and 1.5 beats per minute. The feed supplement had a positive effect on hematologic indices of steers after the impact of technological stress factors. The steers in Test groups had higher lysozyme activity of leukocytes compared with their analogs in Control group by 2.94%, 4.42% and 4.66%; bactericidal activity by 1.92%, 3.34% and 3.81%; and phagocytic activity by 3.14%, 4.47% and 4.74%. Weighing the steers showed the duration of the feed and water intake to increase, in comparison with their analogs by 7.05%, 10.79% and 12.00%, respectively; rest by 3.54%, 6.42% and 7.63%. The steers that consumed the "Glimalask-Vet" feed supplement with their diet were less aggressive and sexually active.

Keywords: Cattle; Fattening; Feed Supplement; Metabolism; Technological Stress

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INTRODUCTION

The effectiveness of the beef production is adversely affected by technological stress factors [1-3]. According to scientists, acting on the body, the stress factors cause its stress due to release of adrenaline into blood, which results in a decrease in natural resistance, an increase in red cells, protein and its fractions in blood, a decrease in appetite and, ultimately, productivity [4-9].

In animal husbandry, there are a number of methods for reducing the impact of stress factors on the animal organism [10-12]. But, antistress agents are considered by the main part of scientists to be the most expedient method [13-17].

We have studied the effectiveness of different doses of the "Glimalask-Vet" feed supplement developed in a laboratory of the Volga Region Research Institute of Manufacture and Processing of Meat-and-Milk Production to correct the stress adaptation of the Kalmyk steers that are characterized by excitability and tricky disposition when they are served in fattening.

MATERIALS AND METHODS

Animals and sampling

To conduct the experiment, 4 groups of Kalmyk steers at the age of 10 months were formed, 30 animals each. During the daytime, the test animals were grazed in the pasture and at night, they were kept in separate pens in fly camps, where they were fed with the supplement as a part of mixed fodder. The youngsters in Control group consumed from 3 to 4 kg of standard mixed fodder in their ration; the steers in Test group 1 were fed with the "Glimalask-Vet" feed supplement in the amount of 400 g per animal instead of sunflower meal, in Test group 2 500 g and in Test group 3 600 g per animal. The feed supplement made from pumpkin cake and a mixture of aminoacetic, malic and ascorbic acids was fed to steers for 5 days before and after the onset of a stress factor. The ratio of acids in the mixture (excluding pumpkin cake) is aminoacetic acid (glycine) 80%, ascorbic acid 12% and malic acid 8%. It should be noted that "Glimalask-Vet" is not a trade name and is accepted conditionally, including Gli = glycine, mal = malic and asc = ascorbic acids and Vet for using in animal husbandry.

When studying the effect of the feed supplement on the physiological and hematological parameters of the steers, feeding was carried out within 5 days after the stress-factor impact.

Samples analysis

Morphological and biochemical compositions of blood were monitored using URIT-800 Vet and URIT-3020 (URIT Medical Electronic Co., Ltd., China) analyzers. Blood for research was monthly selected from the jugular vein. The state of natural resistance was determined by the tests characterizing the phagocytic activity of the white blood cells [18; 19].

The body temperature, respiratory and heart rates were determined in accordance with Cwynar et al. (2014). The behavioral traits were estimated similar by Theurer et al. (2013) [20].

All applicable international, national, and institutional guidelines for the care and use of animals were followed. Experiments were performed in accordance with the Guide for the care and use of laboratory animals [21].

Statistical analysis

The data on different variables, obtained from the experiment, were statistically analyzed by Statistica 10 package (StatSoft Inc.). The significance of differences between the indices was determined using the criteria of nonparametric statistics for the linked populations (differences with $P<0.05$ were considered significant: $^{a}P<0.001$; $^{b}P<0.01$; $^{c}P<0.05$; ns = not significant at $P>0.05$). Student's t-test was applied for the statistical analysis [22]. The mean of a set of measurements was calculated according to the formula:

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$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$, where $\bar{x}$ is a mean value; $\sum_{i=1}^{n} x_i$ is the sum of all x_i with i ranging from 1 to n, n is the number of measurements. The residual variation is expressed as a root mean square error (*r.m.s.e.*): $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$.

The standard error of mean (*s.e.m.*) was calculated using the formula: $s.e.m.(\bar{x}) = \frac{\sigma}{\sqrt{n}}$. The reliability of a sample difference (*Student's t-distribution*) was estimated by the test of the difference validity, which is the ratio between the sample difference and the non-sampling error. The test of the difference validity was determined by the formula: $t = \frac{\bar{x_1} - \bar{x_2}}{\sqrt{s.e.m._1^2 + s.e.m._2^2}} \geq t_{st.}(d.f. = n_1 + n_2 - 2)$, where t is a Student's t-distribution; $\bar{x_1} - \bar{x_2}$ is the difference of the sample mean measurements; $\sqrt{s.e.m._1{}^2 + s.e.m._2{}^2}$ is the sample difference error; $s.e.m._1$ and $s.e.m._2$ are the a nonsampling errors of the compared sample statistics; t_{st} is the standard criterion according to the t-Table for the probability threshold preset depending on degrees of freedom; n_1 and n_2 are the numbers of measurements in the samples compared; *d.f.* is the degrees of freedom for the difference of two mean measurements.

RESULTS AND DISCUSSION

Before the formation of groups, the body temperature and respiratory and heart rates were determined. The studied clinical indices of the steers were found to be within the physiological norm and slightly vary in groups. However, after the groups formation, an increase in temperature was observed in Control group by 0.5°C ($P < 0.001$), in Test group 1 by 0.4 ($P < 0.001$), in Test group 2 by 0.5 ($P < 0.001$) and in Test group 3 by 0.6°C ($P < 0.001$); in respiratory rate by 6.3 ($P < 0.001$), 6.8 ($P < 0.001$), 6.3 ($P < 0.001$) and 6.8 times per minute ($P < 0.001$); pulse rate by 9.9 ($P < 0.001$), 9.5 ($P < 0.001$), 9.8 ($P < 0.001$) and 9.7 beats per minute ($P < 0.001$). This conclusion was confirmed by the indices obtained 5 days after formation of the groups. So, 5 days after the formation of the groups, the body temperatures of the steers in Control group were higher by 0.3 ($P < 0.001$), in Test groups 1 and 2 by 0.1°C ($P < 0.01$), and in Test group 3 by 0.1°C ($P < 0.05$); respiratory rates by 2.3 ($P < 0.001$), 2.2 ($P < 0.001$), 0.5 ($P < 0.05$) and 0.6 times per minute ($P < 0.01$), respectively; pulse rates by 4.0 ($P < 0.001$), 2.0 ($P < 0.001$), 1.7 ($P < 0.001$) and 1.5 beats per minute ($P < 0.001$) (Table 1).

Table 1: Dynamics of clinical and physiological indices of steers before and after formation of groups

Index	Control	Test 1 (400 g/animal)	Test 2 (500 g/animal)	Test 3 (600 g/animal)
Before formation of groups				
Body temperature, °C	38.7±0.02	38.7±0.01 ^{ns}	38.7±0.02 ^{ns}	38.7±0.03 ^{ns}
Respiratory rate, per min.	26.8±0.13	26.6±0.15 ^{ns}	26.9±0.11 ^{ns}	26.6±0.10 ^{ns}
Pulse rate, per min.	74.4±0.10	74.7±0.12 ^{ns}	74.6±0.08 ^{ns}	74.4±0.11 ^{ns}
One day after formation of groups				
Body temperature, °C	39.2±0.03 ^{A}	39.1±0.02 $^{b, A}$	39.2±0.03 $^{ns, A}$	39.3±0.02 $^{b, A}$
Respiratory rate, per min.	33.1±0.15 ^{A}	33.4±0.10 $^{ns, A}$	33.9±0.17 $^{a, A}$	33.4±0.15 $^{ns, A}$
Pulse rate, per min.	84.3±0.18 ^{A}	84.2±0.15 $^{ns, A}$	84.4±0.13 $^{ns, A}$	84.1±0.17 $^{ns, A}$
Five days after formation of groups				
Body temperature, °C	39.0±0.02 ^{A}	38.8±0.03 $^{a, B}$	38.8±0.03 $^{a, B}$	38.8±0.03 $^{a, C}$
Respiratory rate, per min.	29.1±0.21 ^{A}	27.8±0.12 $^{a, A}$	27.4±0.17 $^{a, C}$	27.2±0.19 $^{a, B}$
Pulse rate, per min.	78.4±0.14 ^{A}	76.7±0.17 $^{a, A}$	76.3±0.06 $^{a, A}$	75.9±0.18 $^{a, A}$
a = $P < 0.001$; b = $P < 0.01$ compared with data on Group I; ns = not significant. A = $P < 0.001$; B = $P < 0.01$; C = $P < 0.05$ compared with data on similar Group, but before its formation.				

A similar dynamics of clinical indices was also established when studying the anti-stress effect of the feed supplement after exposure to the "weighing" and "transportation" stressors. The most substantial changes in clinical indices were established in the steers after their transportation.

After transportation at a distance of 100 km, in Control group, the body temperature increased by 0.8 °C ($P < 0.001$), in Test group 1 by 0.4 ($P < 0.001$), in Test group 2 by 0.2 °C ($P < 0.01$) and in Test group 3 by 0.2 °C ($P < 0.001$); respiratory rate increased by 7.1 ($P < 0.001$), 5.5 ($P < 0.001$), 4.5 ($P < 0.001$) and 4.0 times per minute ($P < 0.001$), respectively; and pulse rate by 8.8 ($P < 0.001$), 7.5 ($P < 0.001$), 6.4 ($P < 0.001$) and 6.2 beats per minute ($P < 0.001$) (Table 2).

Table 2: Dynamics of clinical indices of steers before and after transportation

Index	Control	Test 1 (400 g/animal)	Test 2 (500 g/animal)	Test 3 (600 g/animal)
Before transportation				
Body temperature, °C	38.6±0.06	38.7±0.05 ^{ns}	38.7±0.03 ^{ns}	38.6±0.02 ^{ns}
Respiratory rate, per min.	27.4±0.14	27.3±0.17 ^{ns}	27.4±0.12 ^{ns}	27.5±0.15 ^{ns}
Pulse rate, per min.	75.3±0.22	75.5±0.19 ^{ns}	75.3±0.16 ^{ns}	75.1±0.21 ^{ns}
After transportation				
Body temperature, °C	39.4±0.05 ^{A}	39.1±0.03 $^{a, A}$	38.9±0.05 $^{a, B}$	38.8±0.03 $^{a, A}$
Respiratory rate, per min.	34.5±0.17 ^{A}	32.8±0.12 $^{a, A}$	31.9±0.15 $^{a, A}$	31.5±0.19 $^{a, A}$
Pulse rate, per min.	84.1±0.13 ^{A}	83.0±0.24 $^{a, A}$	81.7±0.11 $^{a, A}$	81.3±0.20 $^{a, A}$
a = $P < 0.001$ compared with data on Group I; ns = not significant. A = $P < 0.001$; B = $P < 0.01$; C = $P < 0.05$ compared with data on similar Group, but before animals transportation.				

In comparison with the Control group, the body temperature of steers in Test groups 1, 2 and 3 after transportation was lower by 0.3 ($P < 0.001$), 0.5 ($P < 0.001$) and 0.6 °C ($P < 0.001$); respiratory rate by 1.7 ($P < 0.001$), 2.6 ($P < 0.001$) and 3.0 times per minute ($P < 0.001$); and pulse rate by 1.1 ($P < 0.001$), 2.4 ($P < 0.001$) and 2.8 beats per minute ($P < 0.001$).

There was determined a positive effect of the "Glimalask-Vet" feed supplement in the rations of steers on the hematologic composition under the influence of technological stress factors, i.e., the formation of groups, weighing and transportation.

So, a day after the formation of groups, the number of leukocytes in blood of the young cattle in Control group increased by $1.12x10^9$ /L or 14.81% ($P < 0.001$), in Test group 1 by $0.98x10^9$ /L or 12.88% ($P < 0.01$), in Test group 2 by $1.09x10^9$ /L or 14.49% ($P < 0.001$) and in Test group 3 by $1.04x10^9$ /L or 17.68% ($P < 0.001$); erythrocytes by $0.84x10^{12}$ /L or 10.99% ($P < 0.01$), $0.87x10^{12}$ /L or 11.46% ($P < 0.001$), $0.88x10^{12}$ /L or 11.49% ($P < 0.01$) and $0.94x10^{12}$ /L or 12.42% ($P < 0.01$); hemoglobin by 4.34 g /L or 3.48% ($P < 0.05$), 4.78 g /L or 3.84% ($P < 0.01$), 5.46 g /L or 4.39% ($P < 0.01$) and 5.12 g /L or 4.11% ($P < 0.001$); total protein by 5.21 g /L or 6.68% ($P < 0.001$), 5.54 g /L or 7.11% ($P < 0.001$), 5.34 g /L or 6.85% ($P < 0.001$) and 5.07 g /L or 6.49% ($P < 0.001$) (Table 3). A similar regularity was observed in the content of individual fractions of protein, sugar and lipids in blood.

Table 3: Hematological composition before and after the impact of the "formation of groups" stress factor

Index	Control	Test 1 (400 g/animal)	Test 2 (500 g/animal)	Test 3 (600 g/animal)
Before formation of groups				
Leucocytes, 10^9 /L	7.56±0.19	7.61±0.23 ^{ns}	7.52±0.14 ^{ns}	7.60±0.21 ^{ns}
Erythrocytes, 10^{12} /L	7.64±0.24	7.59±0.19 ^{ns}	7.66±0.28 ^{ns}	7.57±0.25 ^{ns}
Hemoglobin, g /L	124.83±0.93	124.61±0.86 ^{ns}	124.38±1.15 ^{ns}	124.56±0.79 ^{ns}
Total protein, g /L	78.04±0.34	77.93±0.29 ^{ns}	77.98±0.26 ^{ns}	78.10±0.32 ^{ns}
albumins, g /L	38.49±0.19	38.34±0.15 ^{ns}	38.41±0.21 ^{ns}	38.54±0.18 ^{ns}
globulins, g /L	39.55±0.20	39.59±0.14 ^{ns}	39.57±0.21 ^{ns}	39.56±0.17 ^{ns}

Hematocrit, %	46.02±0.31	45.93±0.28 ^{ns}	46.11±0.25 ^{ns}	45.98±0.30 ^{ns}
Sugar, mmol /L	3.39±0.10	3.36±0.14 ^{ns}	3.32±0.11 ^{ns}	3.40±0.16 ^{ns}
Lipids, mmol /L	6.54±0.12	6.50±0.17 ^{ns}	6.47±0.09 ^{ns}	6.39±0.12 ^{ns}
One day after formation of groups				
Leucocytes, 10^9 /L	8.68±0.23 ^{A}	8.59±0.17 $^{ns, B}$	8.61±0.25 $^{ns, A}$	8.64±0.16 $^{ns, A}$
Erythrocytes, 10^{12} /L	8.48±0.19 ^{B}	8.46±0.14 $^{ns, A}$	8.54±0.16 $^{ns, B}$	8.51±0.14 $^{ns, B}$
Hemoglobin, g /L	129.17±1.36 ^{C}	129.39±1.20 $^{ns, B}$	129.84±0.95 $^{ns, B}$	129.68±1.08 $^{ns, A}$
Total protein, g /L	83.25±0.27 ^{A}	83.47±0.26 $^{ns, A}$	83.32±0.29 $^{ns, A}$	83.17±0.31 $^{ns, A}$
albumins, g /L	40.31±0.23	40.40±0.27 ^{ns}	39.95±0.18 ^{ns}	40.96±0.19 ^{c}
globulins, g /L	42.94±0.22	43.07±0.27 ^{ns}	43.37±0.17 ^{ns}	42.21±0.20 ^{c}
Hematocrit, %	48.61±0.37	48.48±0.29 ^{ns}	48.81±0.30 ^{ns}	48.60±0.25 ^{ns}
Sugar, mmol /L	4.08±0.09	4.01±0.12 ^{ns}	4.10±0.06 ^{ns}	4.06±0.09 ^{ns}
Lipids, mmol /L	7.49±0.16	7.42±0.15 ^{ns}	6.58±0.12 ^{a}	7.50±0.14 ^{ns}
Five days after formation of groups				
Leucocytes, 10^9 /L	8.39±0.20	8.04±0.11 ^{ns}	7.92±0.19 ^{ns}	8.86±0.16 ^{ns}
Erythrocytes, 10^{12} /L	8.22±0.17	7.81±0.15 ^{ns}	7.79±0.23 ^{ns}	7.68±0.18 ^{c}
Hemoglobin, g /L	127.77±1.23	125.92±1.41 ^{ns}	125.81±1.28 ^{ns}	125.23±0.79 ^{ns}
Total protein, g /L	82.11±0.18	80.76±0.24 ^{a}	80.42±0.16 ^{a}	79.20±0.28 ^{a}
albumins, g /L	39.80±0.21	38.70±0.25 ^{b}	38.54±0.19 ^{a}	38.28±0.22 ^{a}
globulins, g /L	42.31±0.22	42.06±0.24 ^{ns}	41.88±0.20 ^{ns}	40.92±0.23 ^{a}
Hematocrit, %	47.56±0.28	47.10±0.26 ^{ns}	46.54±0.32 ^{c}	46.42±0.21 ^{b}
Sugar, mmol /L	3.84±0.11	3.65±0.09 ^{ns}	3.56±0.07 ^{c}	3.51±0.14 ^{ns}
Lipids, mmol /L	7.30±0.12	7.19±0.10 ^{ns}	6.95±0.06 ^{c}	6.82±0.09 ^{b}
a = $P < 0.001$; b = $P < 0.01$; c = $P < 0.05$ compared with data on Group I; ns = not significant. A = $P < 0.001$; B = $P < 0.01$; C = $P < 0.05$ compared with data on similar Group, but before its formation.				

The studies conducted 5 days after formation of the groups showed the hematological indices of the test steers to differ in a wider range due to the consumption of the "Glimalask-Vet" feed supplement with an increase in the supplement dose in rations to be accompanied by the growth in its anti-stress effect observed. So, the blood of the steers in Test groups 1, 2 and 3 contained less leukocytes than that of their analogs in Control group by $0.35x10^9$ /L or 4.17% (ns), $0.47x10^9$ /L or 5.60% (ns) and $0.53x10^9$ /L or 6.32% (ns), respectively; erythrocytes by $0.41x10^{12}$ /L or 5.00% (ns), $0.43x10^{12}$ /L or 5.27% (ns) and $0.54x10^{12}$ /L or 6.57% ($P < 0.05$); hemoglobin by 1.85 g /L or 1.45% (ns), 3.33 g /L or 1.96% (ns) and 2.54 g /L or 1.99% (ns); total protein by 1.35 g /L or 1.64% ($P < 0.001$), 1.69 g /L or 2.06% ($P < 0.001$) and 2.91 g /L or 3.54% ($P < 0.001$); sugar by 0.19 mmol /L or 4.95% (ns), 0.28 mmol /L or 7.29% ($P < 0.05$) and 0.33 mmol /L or 8.59% (ns); and lipids by 0.11 mmol /L or 1.51% (ns), 0.35 mmol /L or 4.79% ($P < 0.05$) and 0.48 mmol /L or 6.57% ($P < 0.01$).

However, the most substantial change in the hematological composition of the test steers resulted from the "transportation" stress factor with these changes in the steers, consuming the feed additive, to be less significant.

So, the number of leukocytes in blood of the animals in Control group increased in comparison with the initial one by $1.51x10^9$ /L or 20.46% ($P < 0.001$), in Test group 1 by $0.95x10^9$ /L or 12.63% ($P < 0.05$), in Test group 2 by $0.98x10^9$ /L or 13.23% ($P < 0.01$) and in Test group 3 by $0.67x10^9$ /L or 8.89% ($P < 0.05$); erythrocytes by $1.33x10^{12}$ /L or 18.29% ($P < 0.001$), $0.99x10^{12}$ /L or 13.85% ($P < 0.01$), $0.68x10^{12}$ /L or 9.39% ($P < 0.001$) and $0.49x10^{12}$ /L or 6.70% (NS); hemoglobin by 6.53 g /L or 5.28 % ($P < 0.001$), 3.48 g /L or 2.81% ($P < 0.05$), 2.09 g /L or 1.08% (NS) and 1.59 g /L or 1.27% (NS); total protein by 3.90 g /L or 4.87% ($P < 0.001$), 2.15 g /L or 2.68% ($P < 0.001$), 1.87 g /L or 2.32% ($P < 0.001$) and 1.68 g /L or 2.05% ($P < 0.001$); sugar by 0.78 mmol /L or 23.64% ($P < 0.001$), 0.39 mmol /L or 11.40% ($P < 0.05$), 0.20 mmol /L or 5.71% (NS) and 0.15 mmol /L or 4.25% (NS); lipids 0.97 mmol /L or 15.67% ($P < 0.001$), 0.62 mmol /L or 9.98% ($P < 0.01$), 0.27 mmol /L or 4.33% (NS) and 0.25 mmol /L or 4.03% (NS) (Table 4).

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Table 4: Hematological composition before and after transportation

Index	Control	Test 1 (400 g/animal)	Test 2 (500 g/animal)	Test 3 (600 g/animal)
Before transportation				
Leucocytes, 10^9 /L	7.38±0.19	7.52±0.24 ^{ns}	7.41±0.22 ^{ns}	7.54±0.16 ^{ns}
Erythrocytes, 10^{12} /L	7.04±0.25	7.15±0.19 ^{ns}	7.24±0.11 ^{ns}	7.31±0.22 ^{ns}
Hemoglobin, g /L	123.61±1.29	124.00±1.12 ^{ns}	124.54±0.98 ^{ns}	124.71±1.38 ^{ns}
Total protein, g /L	80.06±0.27	80.35±0.24 ^{ns}	80.44±0.20 ^{ns}	80.51±0.18 ^{ns}
albumins, g /L	39.40±0.16	39.61±0.21 ^{ns}	39.63±0.25 ^{ns}	39.72±0.26 ^{ns}
globulins, g /L	40.66±0.15	40.74±0.20 ^{ns}	40.81±0.24 ^{ns}	40.79±0.19 ^{ns}
Hematocrit, %	45.63±0.23	45.82±0.13 ^{ns}	45.97±0.26 ^{ns}	45.90±0.25 ^{ns}
Sugar, mmol /L	3.30±0.11	3.42±0.09 ^{ns}	3.50±0.14 ^{ns}	3.53±0.08 ^{ns}
Lipids, mmol /L	6.19±0.13	6.21±0.17 ^{ns}	6.23±0.12 ^{ns}	6.21±0.19 ^{ns}
After transportation				
Leucocytes, 10^9 /L	8.89±0.23 ^{A}	8.47±0.27 $^{ns, C}$	8.39±0.25 $^{ns, B}$	8.21±0.20 $^{c, C}$
Erythrocytes, 10^{12} /L	8.37±0.19 ^{A}	8.14±0.28 $^{ns, B}$	7.92±0.16 $^{ns, A}$	7.80±0.27 $^{ns, NS}$
Hemoglobin, g /L	130.14±1.16 ^{A}	127.48±1.30 $^{ns, C}$	126.63±1.29 $^{c, NS}$	126.30±1.05 $^{c, NS}$
Total protein, g /L	83.96±0.38 ^{A}	82.50±0.29 $^{b, A}$	82.31±0.31 $^{b, A}$	82.19±0.23 $^{a, A}$
albumins, g /L	41.14±0.19	40.64±0.21 ^{ns}	40.39±0.26 ^{c}	40.21±0.21 ^{b}
globulins, g /L	42.82±0.20	41.86±0.22 ^{b}	41.92±0.25 ^{b}	41.98±0.20 ^{b}
Hematocrit, %	49.61±0.26	47.58±0.19 ^{a}	47.26±0.23 ^{a}	47.33±0.28 ^{a}
Sugar, mmol /L	4.08±0.08 ^{A}	3.81±0.14 $^{ns, C}$	3.70±0.11 $^{b, NS}$	3.68±0.13 $^{c, NS}$
Lipids, mmol /L	7.16±0.15 ^{A}	6.83±0.11 $^{ns, B}$	6.50±0.17 $^{b, NS}$	6.46±0.12 $^{a, NS}$
a = $P < 0.001$; b = $P < 0.01$; c = $P < 0.05$ compared with data on Group I; ns = not significant. A = $P < 0.001$; B = $P < 0.01$; C = $P < 0.05$ compared with data on similar Group, but before animals transportation.				

Introduction of the feed supplement into the diet of young animals contributed to an increase in their natural resistance. When determining the indices of natural resistance at the beginning of the experiment, significant differences in groups were not established. At the end of the experiment, the steers in Test groups outperformed the steers in Control group with respect to these indices (Table 5).

Table 5: Natural resistance of steers

Index	Control	Test 1 (400 g/animal)	Test 2 (500 g/animal)	Test 3 (600 g/animal)
At the beginning of the experiment				
Lysozyme activity, %	32.81±0.29	32.90±0.34 ^{ns}	32.79±0.37 ^{ns}	32.86±0.25 ^{ns}
Bactericidal activity, %	44.83±0.33	45.01±0.29 ^{ns}	44.98±0.31 ^{ns}	44.91±0.26 ^{ns}
Phagocytic capacity, thous. microbial bodies	25.81±0.42	26.03±0.30 ^{ns}	25.90±0.34 ^{ns}	25.86±0.37 ^{ns}
Phagocytic activity, %	25.27±0.16	25.34±0.21 ^{ns}	25.30±0.17 ^{ns}	25.41±0.19 ^{ns}
Phagocytic index	7.42±0.09	7.36±0.12 ^{ns}	7.44±0.07 ^{ns}	7.39±0.06 ^{ns}
Phagocytic number	2.53±0.06	2.49±0.04 ^{ns}	2.54±0.09 ^{ns}	2.47±0.05 ^{ns}
At the end of the experiment				
Lysozyme activity, %	33.04±0.31	35.98±0.40 ^{a}	37.46±0.33 ^{a}	37.70±0.37 ^{a}
Bactericidal activity, %	45.19±0.37	47.11±0.29 ^{a}	48.53±0.26 ^{a}	49.00±0.39 ^{a}
Phagocytic capacity, thous. microbial bodies	26.04±0.38	28.63±0.31 ^{a}	29.44±0.29 ^{a}	29.78±0.34 ^{a}
Phagocytic activity, %	26.42±0.19	29.56±0.22 ^{a}	30.89±0.27 ^{a}	31.16±0.20 ^{a}
Phagocytic index	7.81±0.10	9.64±0.14 ^{a}	12.40±0.08 ^{a}	12.93±0.11 ^{a}
Phagocytic number	2.60±0.03	2.75±0.02 ^{a}	2.87±0.02 ^{a}	2.90±0.03 ^{a}
a = $P < 0.001$; b = $P < 0.01$; c = $P < 0.05$ compared with data on Group I; ns = not significant.				

So, the steers in Test groups 1, 2 and 3 were superior to their analogs in Control group in terms of the lysozyme activity by 2.94 ($P < 0.001$), 4.42 ($P < 0.001$) and 4.66% ($P < 0.001$), respectively; bactericidal activity by 1.92 ($P < 0.001$), 3.34 ($P < 0.001$) and 3.81% ($P < 0.001$); phagocytic capacity by 2.59 thousand microbial bodies or 9.95% ($P < 0.001$), 3.40 thousand microbial bodies or 13.06% ($P < 0.001$) and 3.74 thousand microbial bodies or 14.36% ($P < 0.001$); and phagocytic activity by 3.14 ($P < 0.001$), 4.47 ($P < 0.001$) and 4.74% ($P < 0.001$). The same regularity was established both in terms of phagocytic index and phagocytic number.

The study of anti-stress properties of the "Glimalask-Vet" feed supplement found that the "formation of the groups" and "weighing" stress factors caused shortening of the periods of food and water intake and rest; the steers spent more time in motion.

So, the observations showed that before weighing the steers in Test groups, the duration of the behavior elements differed insignificantly.

However, after weighing, the duration of feed and water intake by the steers in Control group decreased by 52.8 min. or 15.00% ($P < 0.001$), in Test group 1 by 38.4 min. or 10.70% ($P < 0.001$), in Test group 2 by 28.8 min. or 7.99% ($P < 0.001$) and in Test group 3 by 26.1 min. or 7.28% ($P < 0.001$); the period of active rest shortened by 76.5 min. or 10.00% ($P < 0.001$), 54.5 min. or 7.10% ($P < 0.001$), 37.3 min. or 4.85% ($P < 0.01$) and 33.7 min. or 4.35% ($P < 0.01$); and merycisin by 54.0 min. or 15.33% ($P < 0.001$), 27.3 min. or 7.71% ($P < 0.01$), 22.3 min. or 6.39% ($P < 0.01$) and 21.1 min. or 5.93% ($P < 0.05$).

The Test youngsters were registered to spend more time in motion. In Control group, this period increased by 129.4 min. or 40.06% ($P < 0.001$); in Test group 1 by 93.1 min. or 29.67% ($P < 0.001$); in Test group 2 by 66.2 min. or 21.38% ($P < 0.001$); and in Test group 3 by 59.9 min. or 19.70% ($P < 0.001$).

The comparative analysis showed that the duration of the feed and water intake after weighing in Test groups 1, 2 and 3 was longer than that in Control group by 21.1 min. or 7.05% ($P < 0.01$), 32.3 min. or 10.79% ($P < 0.001$) and 35.9 min. or 12.00% ($P < 0.001$); rest by 24.4 min. or 3.54% ($P < 0.01$), 44.2 min. or 6.42% ($P < 0.01$) and 5.25 min. or 7.63% ($P < 0.001$); and the duration of movement was less by 45.5 min. or 10.1% ($P < 0.001$), 76.5 min. or 16.91% ($P < 0.001$) and 88.4 min. or 19.54% ($P < 0.001$), respectively. Under the influence of a stress factor, there was an increase in sexual activity and aggressiveness in steers observed. The animals that were fed with the feed supplement had their less pronounced manifestations.

The increased dosage of the feed supplement in the rations of the steers was registered to heighten an effect on weakening of the technological stress effect.

CONCLUSION

Thus, the "Glimalask-Vet" feed supplement is advisable to use in correcting the technological stresses. Its most effective dosage is 500 to 600 g per animal a day [23; 24].

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