

## Features of Adaptation of Imported Holstein-Friesian Heifers to the Conditions of Perm Krai

*Stepan Vladimirovich Ponosov and Dzhair Feyruzovich Ibishov*

Perm Federal State-Funded Educational Institution of Higher Vocational Education  
State Agricultural Academy named after Academician D. N. Prianishnikov, Perm, Russia

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**Abstract:** In order to increase milk production of cattle, the animals from Western Europe are imported to Perm Krai. In the process of adaptation to the new husbandry the animals are affected by stress factors. The damaging effect of stress depresses the immune system, thereby increasing the disease incidence of animals. The use of immunomodulating agents accelerates adaptation, increase of body resistance and productivity.

**Key words:** Import cattle % Adaptation % Immunology

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### INTRODUCTION

With the increase of consumption of food, insecurity of their production and increasing scarcity of land resources the modern society faces a comestibles problem. Among the areas of development of the country's dairy livestock, the following have been defined: adaptation of best breeds of the world gene pool to conditions of Russian regions, development and breeding of new breeds and types of animals which gives the heterosis effect on productivity; selection of new breeds with a simultaneous development of the food potential; and the transition to new forms of animal husbandry [1-3].

Intensification of milk and meat production has a negative impact on the health of the animals. The rate of growth, development and reproductive properties of the body and the quality of the products decrease [4-7].

In the period from 2008 to the present time the animals from Western Europe and other regions have been imported to Russia intensively [8]. In the process of adaptation the animals are affected by various stress factors. Currently, scientists distinguish more than 15 different causes of physical, chemical and biological origin, resulting in activation of the adaptation process in animal organism [8, 9].

In connection with the above, there is a need to study the characteristics of adaptation of imported cattle to the new husbandry in the Perm Krai, to develop ways to reduce the impact of stress factors on the body of the animal.

### MATERIALS AND METHODS

To evaluate the adaptive abilities of Holstein-Friesian heifers two groups on the pair-analogues basis were divided. All the heifers under study, with 6 months of pregnancy, were kept under identical conditions of feeding and housing.

In accordance with the set tasks two series of experiments are carried out. In the first series of experiments the factors affecting the adaptation processes in the organism of Holstein-Friesian heifers were examined. The ways of correction of immune processes in adapting to the new husbandry with the application of the drug "Vitadaptin" were examined in the second series of experiments. The drug was not used for the control group.

The following scheme for the correction of immunodeficiency was used in the experimental group: "Vitadaptin" was inserted intramuscularly the first time at a dose of 15 ml and then three times at intervals of 10 days at a dose of 10 ml.

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**Corresponding Author:** Ponosov, Perm Federal State-Funded Educational Institution of Higher Vocational Education State Agricultural Academy named after Academician D. N. Prianishnikov, ul. Petropavlovskaya, 23, 614990, Perm, Russia.

Preparation "Vitadaplin" is a sterile form of wheat germ oil. The oil is obtained by cold pressing of wheat germ. The average content of beta-carotene in it is 15 mg %, tocopherol - 400 mg %, polyunsaturated fatty acids - 73 %, phosphatides - 600 mg %, phytosterol (provitamin D) 570 mg %. All components are biologically active and indispensable in human and animal nutrition. The main active substances of "Vitadaplin" are  $\beta$ -carotene, vitamin E, ergosterol and linoleic, linolenic and arachidonic acid.

Blood sampling was carried out for immunological studies. Content of Ig G, Ig M, Ig A, differential blood cell count, the number of T-and B-lymphocytes were evaluated. The number of leukocytes was counted in the Goryaev's chamber, the amount of immunoglobulins was found by radial immunodiffusion in agar gel according to Mancini.

**Main Part:** At preventive medical examination of the animals arrived, we studied the following body systems: digestive, respiratory, cardio - vascular, nervous, musculoskeletal system. The following data were obtained: heifers are of medium finish, general condition of the animals is satisfactory, with no signs of integrity of skin violations or increase in the sensitivity, hair is tousled, the state of the limbs without damage, no lameness, hoof arrangement is correct, pathological disorders in the digestive, respiratory and cardiovascular systems were not revealed.

After the blood sampling the results that are shown in Table 1 were obtained.

Immunological study shows that the immunoglobulin G content in the test animals was reduced by 50% in relation to the norm, lymphocytes content decreased by 22%, contents of B lymphocytes is 7% below normal, that indicates the suppression of humoral immunity. The content of T lymphocytes is within a normal range.

In the process of adaptation to the new living conditions the stress condition, which affects all the organ systems of the animal, in particular the immune system arises in the animal organism anyway. The emerging immunodeficiency was manifested in increased organism susceptibility to diseases (respiratory, digestive, etc.) [10].

For animals adaptation acceleration and consequently for health improvement as well as to accelerate obtaining of good-quality products from the heifers we applied to the experimental group the Vitadaplin drug at the regimen specified by the manufacturer. 15ml, 10ml, 10ml intramuscularly with an interval of 10 days.

Table 1: Immunological haematological parameters of heifers

Parameters	norm	Control group	Experiment group
Percentage of phagocytosis, %	36-84	50.6±3.2	47.8±3.1
Phagocytic index	1.5	1.8±0.2*	1.6±0.07*
Phagocytic number	0.8	0.9±0.1*	0.7±0.07*
Ig G, g/l	10.61	4.6±0.3*	5.2±0.3*
Ig M, g/l	2.29	2.7±0.1*	3.1±0.1*
Ig A, g/l	0.54	2.2±0.2*	2.4±0.2*
number of leukocytes, 10 <sup>9</sup> /l	4.5-12	6±0.7	5.8±0.6
lymphocytes, %	40-75	16.1±1.4*	17.4±0.7*
T lymphocytes, %	40-45	38.8±2.2*	42.0±1.1*
# lymphocytes, %	30-36	23±1.2	23±1.2

Note: \*-p<0.05 in relation to control group

Table 2: Immunological haematological parameters of heifers after the drug Vitadaplin administration

Parameters	Control group	Experiment group
Percentage of phagocytosis, %	51.1±2*	58.1±4.1*
Phagocytic index	1.7±0.1*	1.8±0.1*
Phagocytic number	1.0±0.2	1.2±0.1
Ig G, g/l	4.0±0.4*	4.9±0.2*
Ig M, g/l	2.7±0.2*	3.6±0.2*
Ig A, g/l	2.1±0.1*	2.6±0.1*
number of leukocytes, 10 <sup>9</sup> /l	6.5±0.7	6±0.7
lymphocytes, %	16.0±1.2*	19.3±1.0*
T lymphocytes, %	37.8±1.5*	58.0±3*
# lymphocytes, %	23±1.3*	25±0.8*

Note: \*-p<0.05 in relation to the control group

The Vitadaplin drug contains a natural complex of vitamins and polyunsaturated fatty acids. In finished form Vitadaplin is an oily liquid with colour from light yellow to brown (can be a slight turbidity, sediment), with a characteristic odor of vegetable oil. The main active substances of "Vitadaplin" are  $\beta$ -carotene, vitamin E, ergosterol and linoleic, linolenic and arachidonic acids. Carotenoids are natural substances, biosynthesis of which is carried out by the plants and some microorganisms. Man and animals can not synthesize them and must regularly receive from the outside, as carotenoids perform a number of vital functions in the body.

After the drug Vitadaplin administration the blood has been taken again for immunological study and the following results were obtained (Table 2).

The above data shows that in the experimental animals as compared to the control ones the percentage of phagocytosis increased by 11%, content of immunoglobulin G decreased and exceeded the control group results by 25%, content of immunoglobulin M increased by 20%, content of lymphocytes increased by 11%, content of T lymphocytes increased by 38%. These data demonstrate a stimulation of the immune system, activation of cellular and humoral immunity.

**Summary:** During the period of adaptation of the imported heifers to the conditions of Perm Krai they develop immunodeficiency, which is associated with decreased lymphocytes level and Ig G, Ig M, Ig A.

### CONCLUSIONS

Under the investigations conducted were formed the following conclusions:

- C The body, feeling the burden of external factors, is depleting. The biggest changes are associated with the work of the system of immune system organs.
- C Cattle imported from Western Europe, adapt to the conditions of Perm Krai during 1.5-2 months.
- C To prevent the influence of stress factors on the animals, we suggest the use of the Vitadaptin drug according to the scheme.

### REFERENCES

1. Varnakova, O.A., V.G. Trufanov and D.V. Novikov, 2010. Productive qualities of Danish black-and-varied cows in the Ryazan region. *Zootechniya*, 4: 23-24.
2. Everly, D.S. and R. Rosenfeld, 1996. *Stress: Nature and treatment*. M: Kolos, pp: 435.
3. Holt-Jimenez, E., 2008. The World Food Crisis. *Policy Brief.*, 16: 4.
4. Sulyga, N.V. and G.P. Kovaleva, 2010. Productive qualities of black-and-varied Holstein heifers-cows of Hungarian selection in the adjustment period. *Zootechniya*, 2: 4-6.
5. Lin, C.V. and K. Togashi, 2005. Maximization of Lactation Milk Production. Without Decreasing. *Persistency. Dairy Sci.*, 88(8): 2975-2980.
6. Opsomer, G., Y.T. Grohn, J. Hertl, H. Leavens and M. Coryn, 2000. Protein metabolism and resumption of ovarian cyclicity post partum in high yielding dairy cows. *Reprod. Dom. Anim. Anim.*, pp: 54-57.
7. Bewley, J.M., 2008. Review: An Interdisciplinary Review of Body Condition Scoring for Dairy Cattle. *The Professional Animal Scientist*, 24: 507-529.
8. Tsiulina, E. and O. Gorelik, 2009. Milk yield of black-and-varied and Holstein cows in the Southern Ural. *Dairy and Beef Cattle*, 4: 25-26.
9. Donnik, I.M., 1999. Biological features of food-producing animals and disease resistance in different ecological zones of the Ural region. *Problems of Radioecology and Software Disciplines*, 2: 214-239.
10. Donnik, I.M., 2000. The health status of food-producing animals animals in industrial areas. *Food security - XXI century*, Ekaterinburg, pp: 114-130.