

THE NATURAL RESISTANCE OF THE ORGANISM OF CALVES OF HOLSTEIN BREED DEPENDING ON THE SEASON OF BIRTH

R. V. Milostiviy, candidate of veterinary sciences;

*D. F. Milostiva, O. O. Kalinichenko, T. O. Vasilenko, candidates of agricultural Sciences
Dnepropetrovsk State Agrarian and Economic University*

Наведені результати досліджень впливу сезону народження на стан природної резистентності організму телиць голштинської породи в умовах промислової технології виробництва молока. Встановлено, що телички, народжені в зимово-весняний період, за впливу регіонально-кліматичних і погодних умов мали кращий стан неспецифічної резистентності організму порівняно з однопітками, народженими в літньо-осінній і осінньо-зимовий періоди. В ранні періоди онтогенезу тварини виявились більш чутливими до погодно-кліматичних умов, маючи більш істотні зрушення гематологічних показників. Відзначене слід враховувати при «холодному» вирощуванні телят, компенсуючи їх надмірні енергетичні витрати на підтримання гомеостазу шляхом збільшення енергії добового раціону.

Ключові слова: телята, голштинська порода, природна резистентність, сезон народження, промислова технологія.

Holstein breed deserves is in particular attention which has a high potential of dairy productivity and specific technological qualities for its intensive industrial usage. However this highly specialized breed reacts on outward farm and natural-climatic irritants rather appreciably and able to realize its genetic potential completely only in making favorable conditions of feeding, caring and keeping [5]. Many scientists note that the duration of productive longevity of cows is reduced under conditions of industrial technology of milk production [1, 3, 4, 6]. This is largely due to the spread of diseases that lead to premature culling of animals, loss of productivity and absence of calves [7–10]. In this regard, there is a great need in heifers being grown to replace the number of cows the dairy herd. In this connection, the topical issue is the study of the body resistance and productivity of young cows in the conditions of action of various factors of technology [11].

The researches were spent on the calves groups, received from the Holstein breed cows which were imported as heifers from Western Europe in Dnipropetrovs'k region. The work was performed in the conditions of private JSC "Agro-Soyuz" Synelnykovo district in 2015–2016 years. Due to the principle of analogue (breed, age, physiological state) were formed three groups of the calves (per 10 heads) the first group was – summer-autumn seasons of calving (August-September), the second group was autumn-winter seasons of calving (November-December) and the third group was summer-spring seasons of calving (February-March). All these groups of calves were in identical conditions of breeding, caring and keeping during the time of studying. After the birth animals were kept in plastic open-air individual houses and from the age of two months they were kept in the lightly constructed calf-houses made from metal parts with capacity 600 heads. Besides the microclimate conditions in the plastic houses and calf-houses were comparable to the environmental parameters. Samples of blood were taken from one, three, six months aged calves before the feeding for studying. With the help of universally recognized methods were determined: hematological parameters (automatic Hematology analyzer Siemens Advia 2120i). Indicators of resistance of the organism were determined by the methods proposed V. E. Chumachenko (1992). Immunoglobulin contents of G and M class we measured by the method of radial immunodiffusion in the gel due G. Mancini et al. Monthly information about macroclimatic indices was received from the Synelnykovo.

The age dynamic of calves' blood indices had significant differences which by our opinion were mainly conditioned by their season of birth. Taking into account the fact that breed conditions (breeding, caring, keeping) for the same age of all groups were made similar, climatic conditions must be considered as prevalent factor of occurring such changes in the blood system, on the basis of which were postnatal period of organism development (table 1).

1. Weather conditions when conducting the research

Groups	Age, days	The conditions for growing calves		
		temperature, °C		relative humidity average, %
		minimum	average	
I	30	4,8	14,6	62,0
	90	-7,0	8,7	75,0
	180	-17,4	3,6	81,3
II	30	-7,5	1,3	88,5
	90	-10,2	0,5	89,3
	180	-17,4	2,1	82,0
III	30	-11,2	4,3	76,0
	90	-11,2	9,2	68,6
	180	-11,2	14,3	69,7

During the time of third group breeding which were winter-spring season of birth (February-March), their further growth and development coincided with more favorable average indices of external temperature and air moisture (14,3 °C and 69,9 %). Besides the temperature changes were at the levels from 11,2 to 33,2 °C. The postnatal and development period of the first summer-autumn birth group calves (August-September) was with more cold weather conditions. During their growth and development the average external temperature was 3,6 °C and moisture – 81,3 % with some lowering to 17,4 °C and 22 %. The same age calves of the second autumn-winter (November-December) period of birth were bred with extremely cold weather conditions when the average air temperature was 2,1 °C and moisture – 82 %. The temperature lowering was to 17,4 °C. It have to be mentioned that such weather conditions had direct affect on the organism of experimental animals taking into account their “cold” keeping method in the farm.

Such exogenous influence of environmental factors cold help told on the state of animals’ organism protective abilities. The results of our hematological researches prove that the calves of the third group which had their postnatal growth and development mainly on spring-summer period with the most favorable temperature, air moisture and weather conditions, had better indices then the same age animals of the first and second groups, which were bred on “cold” seasons. The third group animals of winter-spring season of birth had better indices then their analogues from the first and second groups, which were born in summer-autumn and autumn-winter periods: ferment reamin activity was better for 1.6, and 1.9 times, hemoglobin content – over 17,0 and 9,9 %, leukocyte quality – over 9,7, and 12,8 %, lisozyme activity of blood serum – over 11,7 and 9,7 %, bactericidal activity – over 8,4, and 14,3 %, phagocytic activity – over 25,3 and 24,1 %. These differences especially significantly were shown among 30 days age animals. The third group animals of that age comparing with their analogues from the first and second groups we noted such increasing: alanine aminotransferase – over 1,2 and 2,0 times, aspartate aminotransferase – over 1.4 and 1,3 times, hemoglobin contains – over 17,8 %, erythrocytes quantity – over 24,1 and 15,1 %, leukocytes – over 13,1 and bactericide activity of blood serum – over 1,4 and 1,3 % times (table. 2).

2. Indicators of nonspecific resistance of calves of Holstein breed

Indicators	Age, days	Groups		
		I	II	III
Lysozyme activity, %	30	22,7 ± 1,74	22,8 ± 2,62	31,5 ± 1,83*
	90	34,1 ± 1,56	30,1 ± 2,13	33,8 ± 1,80
	180	31,9 ± 0,98	37,5 ± 1,28	33,8 ± 1,54
Bactericidal activity, %	30	46,0 ± 2,53	50,3 ± 4,89	64,0 ± 2,00*
	90	66,7 ± 3,30	63,5 ± 3,08	66,6 ± 2,02
	180	74,6 ± 1,43	63,8 ± 2,55	72,6 ± 1,66
Phagocytic activity, %	30	19,7 ± 1,88	20,2 ± 1,75	26,9 ± 2,88

	90	23,2 ± 1,40	20,5 ± 2,28	36,3 ± 1,49*
	180	31,3 ± 2,93	34,3 ± 2,04	29,9 ± 1,96

* $P < 0.05$.

In another age periods these differences were not so significant and in six month age the calves of all experimental groups due the blood indices had comparatively the same morphological, biotechnological and immunological state of organism. The calves of the first and the second groups had not significant differences due their hematological indices. It must be mentioned that the difference in the indices of growth energy was not noticed among all groups of animals.

Conclusion

Due the organism reactivity indices to the regional-climatic and weather conditions, the calves of winter-spring period of birth have better adaptability comparing with their same age ones of summer-autumn and autumn-winter seasons of birth. Early age (30 days) calves are more sensitive to extremely cold climate stimuli and should be considered when “cold” type and offset the intensive energy costs of the organism due to the increase in energy daily diet ability.

Prospects for further research. Further studies will be conducted on the effect of natural resistance of the organism calves, which were born in different seasons on the performance of lifetime milk yield and productive longevity. This would allow a rational selection of heifers at an early age for replacement dairy cows. This will increase the economic efficiency of milk production in the conditions of industrial technology.

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