Dependence of the Nonspecific Resistance in Cows from Their Physiological and Clinical State

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In cows phagocytic, bactericidal, and lysozyme activity increased with increasing pregnancy term, decreased by the 2nd day after labor, and increased in the follow-up period. The nonspecific resistance decreased most significantly in the winter-spring period.

Key Words: *phagocytic, bactericidal, and lysozyme activity*

Blood neutrophils play an important role in the nonspecific resistance of animals. Phagocytosis and digestion are the major functions of neutrophilic granulocytes that determine the protection from infections [3,5].

Here we studied seasonal variations in the nonspecific resistance of cows at various stages of pregnancy and after labor.

MATERIALS AND METHODS

Experiments were performed on black-brindled cows (Reflection Sovering and Montvige Chieftain) bred in farms of the Krasnodar krai. Phagocytosis of bacteria by blood neutrophils and bactericidal (BAP) and lysozyme activities of the plasma (LAP) were tested during pregnancy and after labor in the winter-spring and spring-summer period.

Phagocytosis of bacteria by blood neutrophils, BAP, and LAP in cows were determined by methods of I. V. Nesterova *et al*. [4], V. I. Stognik *et al*. [7], and N. P. Smirnova [6], respectively.

RESULTS

The intensity of bacterial phagocytosis in cows increased with increasing pregnancy term, sharply decreased on days 1-2 after labor, and increased on days 19-21. It should be emphasized that the number of phagocytizing neutrophilic granulocytes and their engulfing and digestive activity decreased. Functional activity of neutrophilic granulocytes increased by the 8th and 9th months of pregnancy. On days 19-21 after labor engulfing activity of cells surpassed that observed in the early stage of pregnancy (by 12%).

The early postdelivery period was characterized by a sharp decrease in studied indexes. It primarily concerned the intensity of phagocytosis, which was 13% of the level estimated on the 9th month of pregnancy. However, these parameters progressively increased 5-7 days after labor and pealed on days 19-21.

The intensity of phagocytosis underwent considerable seasonal variations. The number of phagocytizing cells and their engulfing and digestive activity decreased on days 19-21 after labor in the winter-spring period under most unfavorable environmental conditions. In this time the count of phagocytizing neutrophils was 20% lower than in the spring-summer period. Although studied indexes underwent similar changes in various stages of pregnancy and after labor, the total number of active phagocytes and phagocytic number in the winter-spring period were lower than in the spring-summer period. Moreover, we revealed different changes in phagocytic activity of neutrophilic granulocytes in the winter-spring period. During the spring-summer period (most favorable annual season) engulfing activity of cells in the predelivery stage surpassed that on days 19-21 after labor. However, the phagocytic number remained unchanged in the winter-spring period (Table 1).

BAP was lower than LAP. BAP is an integral factor of the humoral resistance reflecting self-purifi-

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TABLE 1. Phagocytosis of Bacteria in Cows during Pregnancy and after Labor in the Spring-Summer and Winter-Spring Period ($M\pm m$, n=10)

Time of observations	Spring-summer period			Winter-spring period		
	phagocytosis by neutrophils, %	phagocytic number	engulfing and digestive activity, %	phagocytosis by neutrophils, %	phagocytic number	engulfing and digestive activity, %
Term of pregnancy, months						
2	52.50±0.34	2.78±0.03	57.55±0.18	39.80±0.57	2.13±0.04	51.51±0.32
3	53.70±0.42	2.86±0.04	59.61±0.31	41.40±0.37	2.23±0.04	53.39±0.33
4	55.50±0.34	3.07±0.05	62.98±0.25	42.50±0.34	2.47±0.04	56.15±0.37
5	56.70±0.42	3.10±0.04	63.65±0.25	46.10±0.31	2.68±0.04	57.28±0.32
6	57.90±0.37	3.59±0.05	65.72±0.22	48.00±0.33	2.83±0.03	58.48±0.30
7	56.80±0.46	3.33±0.04	64.65±0.28	46.70±0.37	2.64±0.03	56.97±0.38
8	58.6±0.4	3.75±0.04	68.32±0.30	48.90±0.31	2.80±0.03	58.28±0.34
9	60.20±0.32	4.39±0.04	69.50±0.31	50.30±0.37	2.93±0.04	59.31±0.36
Postdelivery period, days						
1-2	52.50±0.34	3.19±0.03	65.68±0.29	46.20±0.33	2.55±0.04	56.56±0.38
5-7	57.40±0.43	3.64±0.07	66.19±0.30	47.60±0.37	2.73±0.03	57.84±0.38
19-21	62.70±0.36	3.89±0.04	71.39±0.32	49.80±0.39	2.93±0.03	60.18±0.31

cation capacity of the blood. BAP is determined by the presence of specific substances in the blood that kill and lyse microbial cells. BAP is directed against various microbes [1,2].

BAP strongly depended on the term of pregnancy, period after labor, season, and conditions for living and feeding. In pregnant cows BAP decreased during the winter-spring period, which was probably related to insufficient feeding sources and absence of dietary biologically active substances (Table 2).

BAP and LAP in cows markedly changed on days 19-21 after labor, in various stages of pregnancy, and during the early postdelivery period. BAP and lysozyme activity increasing the term of pregnancy and peaked on days 19-21 after labor. It should be emphasized that these indexes decreased over the first 2 days after labor (Table 2).

BAP and LAP progressively increased up to the 6th month of pregnancy, decreased on the 7th month, and increased again on the 9th month. These indexes

TABLE 2. Dependence of BAP and LAP in Cows during Pregnancy and after Labor in Different Seasons ($M\pm m$, arb. units, n=10)

Time of observations		Spring-summer period		Winter-spring period	
		BAP	LAP	BAP	LAP
Term of pregnancy, months	2	55.53±0.25	49.15±0.26	44.46±0.40	41.04±0.34
	3	57.51±0.31	51.04±0.42	47.98±0.41	42.37±0.31
	4	59.75±0.33	54.35±0.30	52.12±0.38	46.49±0.23
	5	60.81±0.35	56.55±0.27	55.25±0.29	49.60±0.47
	6	62.00±0.37	57.39±0.28	57.08±0.37	52.06±0.32
	7	57.35±0.28	51.47±0.33	50.48±0.38	43.83±0.39
	8	59.81±0.40	49.60±0.31	54.36±0.28	45.59±0.30
	9	63.84±0.32	57.68±0.61	55.59±0.35	47.05±0.37
Postdelivery period, days	1-2	54.17±0.34	47.64±0.38	47.04±0.48	40.94±0.36
	5-7	55.68±0.25	51.24±0.28	48.85±0.27	45.11±0.39
	19-21	68.02±0.39	60.44±0.31	58.26±0.39	49.43±0.35

decreased immediately after labor, but increased in the follow-up period and peaked on days 19-21 (next insemination).

Our results suggest that the intensity of phagocytosis, BAP, and LAP in cows increase with increasing the term of pregnancy, but decrease in the early postdelivery period. The nonspecific resistance of cows decreases most significantly in the winter-spring period.

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