HEMATOLOGICAL DETERMINATIONS IN BRONCHOPNEUMONIA OF TAURINE YOUTH

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Abstract

The most widespread diseases in calves are respiratory diseases, which along with intestinal diseases produce important economic losses through prolonged morbidity, mortality, necessity sacrifices and the lack of weight gain. Bronchopneumoniae have a seasonal dynamics, occurring more frequently during autumn and winter, also may develop in the case animal clusters as enzootic.

Most researchers believe that in gastroenteritis there is dehydration of the body followed by a hemoconcentration and, at the same time, relative increase in the number of erythrocytes. Due to the limited possibilities of compensating the hydro-mineral metabolism, the installation of acidosis is favored.

The research was carried out on a 3-9-month-old taurine youth group grown in a farm in northern Moldova. The total number of erythrocytes, hemoglobin, hematocrit, total white blood cells and blood levels were determined. Blood samples were drawn from the jugular vein into vacutainer tubes on EDTA support. The determinations were done with hematological analyzor ABX MICROS VET ABC.

Research suggests that the number of erythrocytes is increased in the diseased individuals and the leukocyte formula changes significantly for neutrophils, eosinophils and lymphocytes.

Key words: calves, blood, hemoleucograma (CBC)

INTRODUCTION

The most widespread diseases in calves are respiratory diseases, which along with the intestinal diseases produce important economic losses through prolonged morbidity, mortality, necessity sacrifices and weight gain. [3] Bronchopneumoniae have a seasonal dynamic, occurring more frequently during autumn and winter and may develop in the case of animal clusters and in enzootic forms. Bronchopneumonia in cattle youth are considered polyfactorial diseases. [2]

Being also known as "manure disease" or "shelter sickness", in the etiology of the disease both determinant factors (bacteria, viruses, parasites, and fungi) and favorable ones (inadequate climate that acts stressfully on young organisms) may be incriminated.

Generally, bronchopneumonia is manifested by lack of liveliness, severe downcast, inappetence, remitting or intermittent fever. [1] Functional dyspnea, often with subrezantant, polypnea, orthopnea, initially dry and painful then fatty cough, mucosal, muco-purulent, or purulent jetaj. Physical examination of the lung revealed sub-mat sound when percution is performed, tingling of vesicular murmur, undefined breath or tuber, dry or wet bronchial rales, rarely creaking. In complicated, suppurative or gangrenous forms, general and respiratory signs appear In chronic forms, weakness, anemia, rickets, subdevelopment, long, matte, bristly and felting hair and from the respiratory point of view the appropriate signs appear. When various stressors interfere relapses may occur.

MATERIAL AND METHOD

The most widespread diseases in calves are respiratory diseases, which along with the

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The research was done on 10 young bovines aged 3 to 9 months diagnosed with bronchopneumonia (LB), raised in a farm in Northern Moldavia region and 10 healthy clinical patients (LM) from the same region and age.

Individuals were evaluated through consecutive semiological methods, inspection, palpation, listening, thermometry. One calf from the group, diagnosed with bronchopneumonia was subjected to necropsy and histopathological examination in the lung was also performed. Pulmonary samples were stained with HEA (hematoxylin-eosin-methyl blue).

Evaluated haematological indices included total red blood cell count (RBC, T/l), haemoglobin concentration (Hb, g/dl), total white blood cell count (WBC, G/l), packed cell volume (PCV, l/l), and mean corpuscular volume (MCV, f/l). The indicators of haematological profile were analysed by an automatic haematological analyser ABC-vet (Horiba ABX, France), as well as the leukocyte formula. Blood samples were drawn from the jugular vein into vacutainer tubes on EDTA support.

RESULTS AND DISCUSSIONS

For a clearer image of the obtained results, the haematological data was compared with literature values and haematological values obtained from clinically healthy individuals, from the same geographic region, raised under similar conditions.

Following haematological investigations of the erythrocyte series in the control group, we found that the number of erythrocytes was 7.3, with very significant differences compared to the control group. These results correspond to the literature data. Hypoglobulinemia may be due to a haemorrhage, erythropoiesis insufficiency, excessive hemolysis, deficiency in trace elements that provide chromogenesis, and chronic protein deficiency.

In the peripheral blood of healthy animals there is a constant niche of erythrocytes and hemoglobin. Erythrocyte isocythaemia is an aspect of homeostasis with consistency on the dynamic balance between the production and destruction of erythrocytes and hemoglobin. Erythropoiesis knows as pathogenetic pathways the disruption of the fundamental biochemical processes of normal erythropoiesis: the synthesis of nucleic acids and the synthesis of hemoglobin.

Bronchopneumonia occurs as a result of the passage of young bulls through diarrhea syndrome, where the resistance of the body decreases and the native microflora of shelters rich in pathogenic microorganisms, exalt its virulence due to a break in the balance between micro- and macro-organisms.

Table 1 The significance of statistical differences of the erythrocyte series between the control lot and the bronchopneumonia affected individuals

Specification			n	Calculated statistical indicators				Meaning of differences in batch averages (FISHER test)
				$\bar{X} \pm s_{\bar{x}}$	V%	Min.	Max.	
RBC ($X10^6/mm^3$)		LM	10	7.3±0.31	13.51	5.9	8.8	$\hat{F}_{20.78} > F_{0.001\%}(15.38) \rightarrow ***$
		LB		5.09±0.37	23.05	3.6	7.2	
Hb (g/dL)		LM	10	9.30±0.38	12.92	7.9	11.6	$\hat{F}_{12.81} > F_{0.01\%}(8.28) \rightarrow **$
		LB		7.66±0.25	10.55	6.4	8.6	
Ht (%)		LM	10	35.49±1.09	9.75	29.1	40.2	$\hat{F}_{20.29} > F_{0.001\%}(15.38) \rightarrow ***$
		LB		28.15±1.20	13.55	21.9	33.5	
Red blood cells	VEM (μ^3)	LM	10	49.02±1.45	9.37	44.5	57.1	$\hat{F}_{8.43} > F_{0.01\%}(8.28) \rightarrow **$
		LB		56.67±2.19	12.25	47.2	68.1	
	HEM µm/g/E	LM	10	12.81±0.51	12.81	10.4	15.3	$\hat{F}_{4.65} > F_{0.05\%}(4.41) \rightarrow *$
		LB		15.70±1.23	24.87	13.6	23.6	
	CHEM g/dl	LM	10	26.29±1.10	13.29	22.1	32.6	$\hat{F}_{0.59} < F_{0.05\%}(4.41) \rightarrow n.s$
		LB		27.78±1.59	18.14	27.8	38.6	

LM = young bovines from the control lot; LB = young bovines from bronchopneumonia affected group

In the batch of young cattle with bronchopneumonia, hemoglobin investigations showed values of 7.66 g / dl. The values obtained are below the mean of the control group, the differences being significant. Decreasing the amount of hemoglobin is consistently seen in anemia syndrome resulting either from poor red blood cell loading with hemoglobin or from numerical reduction. Poor loading of erythrocytes in iron is due to iron deficiency, which is actively involved in the synthesis of hemoglobin.

Analyzing the values of the hematocrit in the youth group of cattle suffering from bronchopneumonia, we see a decrease down to 28.15, the differences being significant compared to the control group. These values, correlated with the number of erythrocytes and the amount of hemoglobin, are indicative of hypoglobulinemic anemia and lack of erythrocyte loading with hemoglobin.

In the batch of young cattle suffering from bronchopneumonia, the values of V.E.M. were 56.67 µ3. These numbers are higher than the control group, the differences being statistically significant.

For the bullock youth group affected by bronchopneumonia, H.E.M. was 15.7 compared to the value recorded for the control group (12.81), the differences being significant.

C.H.E.M. values that were registered in the cattle group suffering with bronchopneumonia were 27.78. These values are closer to those of the control batch and the differences are insignificant.

For the group of young cattle affected by bronchopneumonia, the recorded white blood count was 5.57, compared to 6.86 for the control group. Leukopenia is believed to follow various mechanisms: inhibition of maturation and diabase, reduction of leukocytogenesis, elimination from circulation or destruction within the tissues beyond the regenerative capacity of the leukocyte-forming organs etc. [3]

Table 2 The significance of statistical differences of the leucocyte series between the control lot and the bronchopneumonia affected individuals

Specification			n	Calculated statistical indicators				Meaning of differences in batch averages (FISHER test)
				$\overline{X} \pm s_{\overline{x}}$	V%	Min.	Max.	
WBC ($X10^6/mm^3$)		LM	10	6.86±0.30	14.10	5.6	8.9	$\hat{F}_{6.39} > F_{0.05\%}(4.41) \rightarrow *$
		LB		5.57±0.40	23.17	3.3	7.6	
The leukocyte formula	N(%)	LM	10	34.90±0.84	7.69	31	39	$\hat{F}_{126.2} > F_{0.001\%}(15.38) \rightarrow ***$
		LB		49.10±0.93	6.03	43	53	
	E(%)	LM	10	4.2±0.29	21.87	3	6	$\hat{F}_{14.58} > F_{0.01\%}(8.28) \rightarrow **$
		LB		2.40±0.37	48.90	1	4	
	B(%)	LM	10	0.20±0.20	210.81	0	0	$\hat{F}_{6.23} > F_{0.05\%}(4.41) \rightarrow *$
		LB		0.80±0.20	79.05	0	2	
	M(%)	LM	10	3.60±0.45	39.71	2	6	$\hat{F}_{4.56} > F_{0.05\%}(4.41) \rightarrow *$
		LB		4.90±0.40	26.25	3	7	
	L(%)	LM	10	57.1±0.99	5.50	52	62	$\hat{F}_{78.48} > F_{0.001\%}(15.38) \rightarrow ***$
		LB		42.80±1.27	9.39	36	48	

LM = young cattle control group; LB = the young bullock group suffering from bronchopneumonia

The following results were recorded for the bullock youth group suffering from bronchopneumonia: 49.10% neutrophils; eosinophils 2.4%; basophil 0.8%; monocytes 4.9%; lymphocytes 42.8%. Compared to the young bullocks from the control group there is an significant increase in the number of neutrophils and a significant decrease in lymphocytes.

The necropsy examination performed on one of the individuals from the bronchopneumoniae group revealed the presence of slightly retractable, red-sapped and glossy areas in the apical and cardiac pulmonary lobes, hard to palpate and at the floating test, the lung fragments collected from those areas fell to the bottom of the vessel (Figure 1).

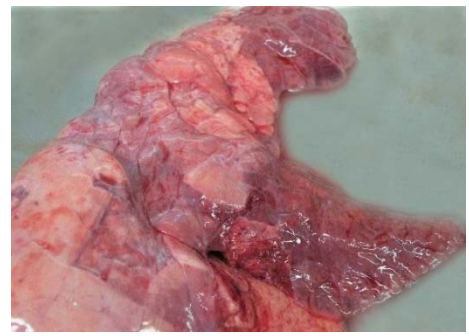

Fig. 1 Lung. Lymphohistiocitary bronchopneumoniae

The histological examination identified septal lymphohistiocitary proliferations, but also the peribronchiolar and periarteriolar hyperplasia.

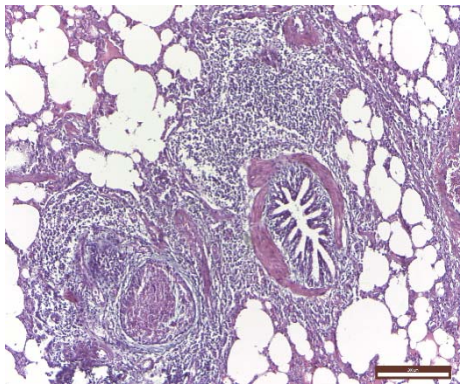

Fig. 2 - Peribronhyolar lymphohistiocytar hyperplasia with mansonal appearance and periarteriol proliferation. Col. HEA

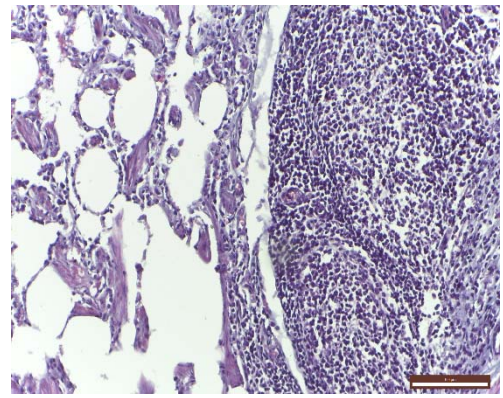

Fig. 3 - Lymphohistiocytary hyperplasia outbreak. Col. HEA

CONCLUSIONS

1. The number of erythrocytes is lower than in the control group, the differences being significant.
2. The amount of hemoglobin is below the control values, the differences being not statistically significant.
3. The value of the hematocrit is lower compared to the control group; the differences are significant.
4. The values of the average erythrocyte volume were increased, the differences compared to the control being significant.
5. The average erythrocyte content of hemoglobin is increased in the diseased group compared to the control, but the differences are statistically insignificant.
6. The mean red blood cell concentration in hemoglobin is increased compared to the control group, the differences being significant.
7. Bovine youth suffering from bronchopneumonia exhibits a macrocytic and normochrome anemia (elevated V.E.M.) (H.E.M. and C.H.E.M. within normal range)
8. The necropsic and histopathological examination revealed the evolution of lymphohistiocitary bronchopneumonia.

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