



Peculiarities of respiratory pathology of young cattle in the lower Volga region Russian Federation

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ABSTRACT

An important element in solving problems relating to preservation of young cattle livestock and production increase of livestock products is timely diagnosis, prevention and treatment of diseases of non-communicable etiology, among which one of the most common is bronchopneumonia. Therefore, the development of effective methods of treatment and prevention of this pathology is an urgent problem of veterinary medicine. The disease leads to calves deep, sometimes irreversible disturbances of bronchopulmonary system functions. Lung function is one of the first to be disrupted, playing an important role in the protective immunological reactions of the body, through which there is an increase in virulence of microorganisms, which leads to the general intoxication and severe bronchopneumonia. The situation on non-specific bronchopneumonia of calves in the Lower Volga region is tense, but it is to the same extent as in other regions having problems with this pathology. It is obvious that the susceptibility of calves to respiratory diseases is formed under the influence of antenatal influences and is manifested in the presence of adverse environmental factors leading to depletion of reserves adaptation in the first months of animal life.



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INTRODUCTION

The given materials as a characteristic of the situation on nonspecific bronchopneumonia in the farms of the central and northern zones of the Lower Volga region give grounds for an unfavorable prognosis on elimination of this pathology at the farms of the region in the nearest future (Khristoforovich *et al.*, 2016; Smolentsev *et al.*, 2018; Samsonov *et al.*, 2018).

Non-communicable diseases of young cattle is one of the main problems of cattle breeding. Accord-

ing to the Department of veterinary medicine of the Ministry of Agriculture for 2016, this nosological category amounted to 98.5% of the cattle's incidence (Semenov *et al.*, 2018). A significant proportion of diseases of non - communicable etiology are recorded as respiratory diseases – 18.7%. In absolute terms, respiratory pathology was diagnosed in 892204 cattle, 714669 of them calves, among which the mortality rate was 7.8% (Anatolievna *et al.*, 2016; Ilyasovich *et al.*, 2016; Egorov *et al.*, 2018).

Printed sources of veterinary information for decades have noted the wider spread of nonspecific bronchopneumonia in farms of almost all geographical zones; up to 15-20% of young stock die (Matveeva *et al.*, 2015; Dmitriyevich *et al.*, 2016).

Given the economic importance of widespread diseases, which include respiratory diseases of young cattle, information control over the situation in the regions is important (Valiullin, 2017; Popov *et al.*, 2018).

From the point of view of the necessity for scientific-informational analysis, the largest livestock region – the Lower Volga region, – is of particular importance. This region was the subject of research.

MATERIALS AND METHODS

Methods of own observation, statistical and epidemiological analysis were used.

The studies were based on the current veterinary and statistical registration of respiratory pathology among young cattle at the farms of the northern and central zones of the Lower Povolgya region during 2014-2016, submitted in the 2-VET form. Document data of veterinary accounting and veterinary reporting, laboratory examinations and materials of pathological anatomical autopsy became an analytical basis.

Own observations covered the dairy industry of the Volgograd and Saratov regions in the right-bank and trans-Volga territories. In the first one, the own research was carried out in the conditions of dairy farms in two territories — the Kirov collective farm and JSC Aksayskoye of Oktyabrsky district; in the second — at the Mumovskaya farm of Tatishchevsky district and breeding farm JSC Trudovoy of Marksovsky district.

A number of studies were carried out in the Saratov interregional veterinary laboratory: blood serological analysis of calves for viral respiratory diseases – red nose, BD-BS, adenovirus and RS-infections; bacteriological studies of pathogenic microflora; determination of pathogenic microflora resistance to

antibiotics with a wide therapeutic application. Statistical analysis is performed in accordance with the generally accepted method.

RESULTS AND DISCUSSION

According to the reports of veterinary services of Saratov and Volgograd regions, young cattle respiratory diseases at the farms of the Lower Volga region, are being a constantly registered pathology. In the period 2014-2016, respiratory diseases among the livestock of calves under six months annually accounted for 22.7% - 42.1% of the total incidence of non-communicable diseases of this productive animals species (Table 1).

The number of sick calves of this nosological category, annually registered in the region, was in absolute values 101952 - 181458 cattle (Table 2).

The main diagnosis in the structure of the registered respiratory pathology is nonspecific bronchopneumonia – the average morbidity of 36.3%.

It is noteworthy that bronchopneumonia most often occurs at an early age at 73% of young animals. The greatest risk period for calf disease is the colostrum – 1-10 days of life. In the first 10 days after birth, on average more than 64 thousand calves with nonspecific bronchopneumonia were registered – 47%; at the age of 10-30 days – up to 42 thousand – 31% of the total number of registered within a six-month period. In the following months, the number of sick cattle decreased, but remained at the level of 22% (Table 2).

The annual mortality number of calves with nonspecific bronchopneumonia had proportions correlated with the dynamics of morbidity. Over the analyzed period, the average level of calves fatality from nonspecific bronchopneumonia was 2.29%.

Such dynamics of the extent of calves lesion with non-specific bronchopneumonia occurred annually, reflecting a pattern indicating one of the main etiological factors of the stationary pulmonary pathology of calves – unsatisfactory neonatal resistance. The latter is reasoned by the fact that most of the calves begin to suffer during the colostrum period when the frequency of such manifestations is the highest. Moreover, the immunodeficiency of young cattle is formed due to the health instability of the breeding livestock at farms.

Materials of veterinary reporting (2-VET) on regions indicate an obstetric-gynecological unsatisfactory state of the livestock (Table 3). Medical examination in the Volgograd region revealed tens of thousands of sick cows — 73784 heads, that is 37.9% from the number of 194479 examined. Annually

Table 1: Structure of incidence of non-communicable diseases of young cattle at cattle breeding farms of the Volgograd and Saratov regions

Indicators	Research period		
	2014	2015	2016
Digestive system diseases	56.4%	75.4%	49.8%
Respiratory diseases	42.1%	22.7%	36.3%
Metabolic diseases	1.0%	0.9%	12.8%
Reproductive diseases	0.3%	0.8%	0.3%
Intoxication	0.1%	0.1%	1.0%
Injuries	0.1%	0.1%	0.1%

Table 2: Number of annually registered calves with bronchopneumonia at the farms of the Lower Volga region

Indicators	A total of calves		including those got sick at the age of		
	calves fell sick	died %	1-10 days	10-30 days	Older than 1 month
			calves fell sick	calves fell sick	calves heads
2014	181458	1.74	82454	57158	41846
2015	101952	2.62	50220	30262	21470
2016	121304	1.93	60472	38124	22708
On average	134904	2.29	64382	41848	28674

Table 3: Clinical state of cows according to the results of medical examination of breeding stock in farms of the region

Indicators	Number of cows examined, on average for 2014-2016				
	Volgograd region		Saratov region		
	Heads	%	Heads	%	
Total	194479		45341		
Pathological manifestations revealed:	73784	37.9	1256	15144	33.4
endometritis	36765	18.9	406	9113	20.1
mastitis	72372	37.2	892	17904	39.5
abortion	5019	2.6	52	1231	2.8
retention of placenta	5184	2.7	1405	3.0	
stillbirth	1349	0.7	544	1.2	

Table 4: Results of blood biochemical study of breeding livestock at farms of the Volgograd and Saratov regions for 3 years on average (2014-2016)

Indicators	Percentage of samples with reduced content of physiological elements	
	Volgograd region	Saratov region
Number of cows examined	7944	8456
Carotin	48.5	47.2
Total protein	28.9	30.5
Calcium	48.6	50.5
Phosphorus	30.5	29.8
Glucose	26.2	25.2
Alkaline reserve	31.1	30.9

Table 5: Information on the effectiveness of treatment aimed at ensuring the safety of calves in outbreaks of non-specific bronchopneumonia

Indicators	Years		
	2014	2015	2016
Number of heads subjected to treatment	7286	6370	3398
Number of heads recovered	6303	4968	2046
Effectiveness of therapy, %	93.36	93.36	93.43

there are registered: endometritis — in 36765 cows (18.9%); mastitis in 72372 (37.2%); abortions — in 5019 (2.6%); retention of placenta — in 5184 cows (2.7%). The facts of the so-called stillbirth of calves are constant — 1349 cases (0.7%).

In the Saratov region, there were registered 15144 cows with pathological manifestations out of 45341, dispensated — 33.4%. The revealed quantitative nosological proportions in percentage relation here had a similar character with the central part of the Volga region — Volgograd region (Table 3).

The potential immunosuppressive of calves during the neonatal period with the historical unsatisfactory clinical state of the breeding livestock is evidenced by the indicators of mass laboratory-biochemical studies on cows conducted at farms of the central and northern zones of the Lower Volga region (Table 4).

The percentage of samples with reduced content of basic biochemical elements reflecting the metabolic status of the breeding livestock is recorded in almost fifty percent of the animals examined: as for carotene – 47.2 - 48.5%; calcium – 48.6 - 50.5% (Table 4). According to other metabolic indicators – total protein, phosphorus, glucose, alkaline reserve, a deficiency occurs in one-third of the population.

According to statistical data, upon bronchopneumonia outbreaks among calves, therapeutic measures taken by farms veterinary service on dysfunctional farms, allow to maintain 93.36% of calves (Table 5). The effectiveness of therapy in respiratory diseases in all categories of farms is shown at 93.4%.

Own study of outbreaks of respiratory diseases among young cattle in the conditions of four dairy enterprises of the region did not reveal epizootological causes of mass calf diseases. A comprehensive examination of 1584 calves under 6 months showed that 7.9% had symptoms of bronchopneumonia: reduced motor activity, the presence of painless wet and deep coughing at rest, sputum secretion with catarrhal-purulent inclusions, respiratory syndrome – wheezing and sound creation in the lungs. At the same time, serological analysis of the blood of healthy animals recorded seronegativity

to pathogens of viral respiratory infections – adenovirus and respiratory syncytial, infectious rhinotracheitis, BD-BS. The sick calves had no changes in the serological profile.

Pathological anatomical studies of 41 dead calves, showed that 75% (30 calves) had normal pathological changes in respiratory organs for bronchopneumonia, 25% (11) recorded complicating pathogenetic processes: emphysema, pleuritis, cerebral pneumonia.

In bacteriological study of nasal mucus from sick calves, bacteria of conditionally pathogenic spectrum were isolated: Streptococcus pneumonia – in 100% of animals; Escherichia coli O141 – in 100% and Escherichia coli O26 – in 93%; Staphylococcus aureus – in 86%; Enterococcus faecium – in 71%; Pasteurella multocida – in 41%; Staphylococcus epidermidis – 39%.

The obtained bacterial microflora cultures showed a significant level of resistance to a number of chemotherapeutic preparations widely used in respiratory diseases. A significant degree of antibiotic resistance of isolated bacterial agents was established to tetracycline and furazolidone – 20%; norfloxacin and doxycycline – 40%; amoxicillin, enrofloxacin, fudonin, streptomycin, levomycetin – 60%; ampicillin –80%; erythromycin, gentamicin and rifampicin – 100%.

According to the results of its own observations, the effectiveness of the treatment of calves with bronchopneumonia varies at different farms. The use at the studied farms of common means of treatment of calves with bronchopneumonia using a common chemotherapeutic basis gives unstable therapeutic results – up to 77.8% - 85.9%.

The above-mentioned material does not give grounds to link the stationarity of respiratory pathology in young cattle at livestock farms of the Lower Povolgya region with geographical factors. Analysis of the main parameters of dysfunctional farms draws attention to the etiological correlation of the predisposition of calves to bronchopneumonia in the neonatal period and the prevalence of obstetrical-gynecological diseases among the

breeding stock at farms. From the standpoint of this connection, the susceptibility of calves to this pathology is formed under the impact of antenatal influences and manifests itself only in the presence of adverse environmental factors leading to the depletion of adaptation reserves in the first months of calf life. Therefore, there are grounds to assume that the constancy of losses of productive potential in cattle herds in the region is caused by farm implementation of pathological conditions of enzootic type for cows and calves related to conditionally pathogenic microflora.

Thus, the given materials being a characteristic of the situation on nonspecific bronchopneumonia at the farms of the central and northern zones of the Lower Povolgya region, give grounds for an unfavorable prognosis on the elimination of this pathology at the farms of the region in the near future.

CONCLUSIONS

The situation on non-specific bronchopneumonia of calves in the Lower Volga region is tense, but it is to the same extent as in other regions having problems with this pathology. It is obvious that the susceptibility of calves to respiratory diseases is formed under the influence of antenatal influences and is manifested in the presence of adverse environmental factors leading to depletion of reserves adaptation in the first months of animal life. The obtained set of regional characteristics of bronchopneumonia of non-infectious etiology allows to consider this pathology as an indicator of the ecological unwell-being of big cattle herds in the Lower Volga region.

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