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Occurrence of Enteroinfectious Pathogens in Agricultural Animals and Poultry

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Abstract

Herein information is provided on the occurrence of enteroinfectious pathogens in agricultural animals and poultry. As a result of studies conducted for the determination of a degree of occurrence of enteroinfectious pathogens among the farm animals and poultry in some farms of the South Kazakhstan Almaty, Jambyl, Aktyubinsk, Qyzylorda, East Kazakhstan and Karaganda regions, we have identified such pathogens as referred to the enteric infection.

Keywords

Enteroinfection; Pathogen; Salmonella; Escherichia; Klebsiella; Staphylococci; Olm

Introduction

The present-day agricultural policy in the Republic of Kazakhstan is aimed at the fulfillment of the primary objective—people's growing needfor foodstuffs. To succeed in the achievement of such objectives, one should ensure further increase in livestock production. Preservation of youngsters and breeding of healthy and well developed young stock, which is adapted to new housing conditions, forms the basis of an increase in livestock production yield. The main losses of young stock are conditioned by enteric infections caused by the enteroinfectious pathogens [1-3].

Enteric infections are referred to zooanthroponosis, which is the most commonly encountered infection worldwide, and from year to year, it becomes a real problem in all countries of the world according to the data from WHO [4,5].

A damage caused by an enteric infection consists not only in the mortality of farm animals and poultry but also in the fact that the recovered animals and poultry are bacilli carriers during a long period and become constant sources of the environmental contamination. The carrier state is widespread among the cattle (15-25.4%), sheep (20-30%), horses (10-35.0%), swine (12.5-24.5%), chicken hens (6-24.1%), ducks (8-14.8%), and geese (4-15.2%). On the average, the carriers are identified among the healthy animals and poultry within the range of 6.8–32.2% [6-8].

The epizootic and epidemiological tension in relation to enteric infections caused by enteroinfectious pathogens has increased in recent years due to some changes in the cattle breeding and fattening methods and the rules of zootechnics and veterinary attendance of animals. Antienteric infection vaccine inoculation of animals and poultry has become nonmandatory, and it is not provided for in the plan of animal epidemic countermeasures of the Committee for Veterinary of Medicine of the Ministry of Agriculture of the Republic of Kazakhstan.

Under the existing social and economic conditions, the disease control specifics, which are general for people and animals, require implementation of a complex coordinated package of animal epidemic countermeasures and sanitary-veterinary and sanitary-hygienic measures [9,10].

Methods

The work was carried out by applying methods used in international scientific practice and was improved on a continuous basis due to some patent-information studies.

Epizootology-related matters and a degree of occurrence of enteric infections in farm animals and poultry have been studied directly under the farm conditions of the Republic of Kazakhstan during the last 10 years.

The etiology of diseases of farm animals and poultries registered in some farms of the Republic was studied in the bacteriosis biotechnology laboratory of the Kazakh National Agrarian University as well as in some regional veterinary laboratories.

Some materials from fallen and sick animals (bone marrow, spleen, lungs, lymph glands, affected portion of the intestinal tract) were used for selection of cultures. For the intravital bacteriodiagnosis, such fecal masses were studied as taken from some animals suffering from diarrhea.

To study the primary cultures, the following nutrient media were used: beef-extract broth, beef-extract agar, Endo medium, Kitt-Tharozzi medium, Kauffman medium, and Levin medium. The primary selection of cultures was done on the basis of the growth characteristics as applicable to the media and microscopy of preparations from some individual colonies.

Morphological, cultural, and biochemical properties of the said cultures were studied according to the generally accepted procedures.

The selected cultures were identified according to the Bergey's Manual.

Results and Discussion

The statistical data analysis conducted by us, in the Veterinary Medicine Department of the Ministry of Agriculture of the Republic

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of Kazakhstan, for studying the enteric infection in animals and birds, has showed that the infection is widespread among the animals and birds in the republic causing a great economic damage not only to cattle breeding and poultry enterprises but also to private farms.

To study the occurrence of enteroinfectious pathogens in farm animals, studies were conducted in different farms of the Almaty, Aktyubinsk, Jambyl, East Kazakhstan, South Kazakhstan, Qyzylorda, and Karaganda regions. In most parts of the inspected farms, such diseases have been observed during several years.

Under natural conditions, we observed that the enteric infection in animals was in enteric and septic forms. The main clinical symptoms of the disease were as follows: diarrhea passing into the intractable one, faintness, anorexia, mental depression, and body dehydration.

Pathologicoanatomic changes in fallen animals represented catarrhal and catarrhal hemorrhagic gastroenteritis, and there were ulcers on the gastric mucosa, the small intestine, and the blind gut as well as multiple pinprick bleeds on the gastric mucosa, the small and large intestines, and under the splenic capsule; the regional mesenteric lymph nodes were increased and were hydropic.

In the disadvantaged farms, 240 samples of pathologic material taken from calves, lambs, and foals having clinical symptoms of diarrhea were subject to the bacteriologic examination for mass enteric diseases of farm animals.

For the postmortem bacteriodiagnosis, 360 samples from fallen calves, lambs, pigs, and foals were studied during the first 10 days. For the study, the liver, spleen, lungs, mesenteric lymph nodes, small intestine, heart, and tubular bone were taken.

For the intravital bacteriodiagnosis, 80 samples of fecal masses of the animals suffering from diarrhea, which were not treated with antibacterial preparations, were studied. The said samples of fecal masses were taken from sick animals into the sterile test tubes directly from the straight intestine by using a boiled rubber catheter.

To study the primary cultures, the following nutrient media were used: beef-extract broth, beef-extract agar, Endo medium, Kitt-Tharozzi medium, Mink media, Kauffman medium, and Levin medium.

The primary selection of cultures was done on the basis of the growth characteristics as applicable to the media and microscopy of preparations from some individual colonies. Morphological, cultural, and biochemical properties of the said cultures were studied according to the generally accepted procedures.The selected cultures were identified according to the Bergey's Manual.

As a result of the studies conducted on organs taken from sick and fallen animals and also on fecal masses of healthy animals, we selected and identified the following cultures that are, under certain conditions, capable of causing intestinal diseases in the young stock of farm animals: 445, *Salmonella*; 155, *Escherichia*; 56, *Klebsiella*; 72, streptococci (diplococci); 62, staphylococci; and 12, olm (Table 1).

The data given in Table 1 is indicative of the fact that, in total, 802 cultures were selected from the said animals, of which Salmonella was 55.5%; Escherichia, 19.3%; Klebsiella, 7.0%; olm, 1.5%; streptococci, 9.0%; and staphylococci, 7.7%.

A degree of occurrence of enteroinfectious pathogens in poultry was studied in some farms of the South Kazakhstan, Almaty, Jambyl, Aktyubinsk, and Karaganda regions. Different organs taken from sick and fallen poultry and fecal masses from healthy poultry were used as materials for bacteriological studies. In total, 125 chicken hens, 75 ducks, 75 geese, 25 turkeys as well as 20 samples of fecal masses (5 samples from each poultry species) were tested.

The primary selection of cultures was done on the basis of the growth characteristics as applicable to the media and microscopy of preparations from some individual colonies.

Morphological, cultural, biochemical, and antigenic properties of the selected cultures were studied according to the generally accepted procedures.

As a result of the studies conducted, we have identified such pathogens from the sick poultry as referred to the enteric infection: 178 cultures of *Salmonella*; 86, *Escherichia coli*; 11, *Klebsiella*, and other bacteria—19 cultures of Streptococcus; 26, Staphylococcus; from the fallen poultry—68 cultures of Salmonella; 41, Escherichia coli; 6, Klebsiella; 8, streptococci; 14, staphylococci; from fecal masses—22,

Item	Animal species from which samples were taken	Samples	Selected cultures					
			Salmonella	Escherichia	Klebsiella	Olm	Streptococci	Staphylococci
1	Calves: From sick and fallen animals, from fecal masses	60 90 20	39 76 20	18 29 9	5 12 2	1 2 1	6 11 4	7 11 4
	Total	**170**	**135**	**56**	**19**	**4**	**21**	**22**
2	Lambs: From sick and fallen animals, from fecal masses	60 90 20	37 68 25	14 19 8	3 8 3	2 1 1	3 12 1	2 8 5
	Total	**170**	**130**	**41**	**14**	**4**	**16**	**15**
3	Pigs: From sick and fallen animals, from fecal masses	60 90 20	34 58 22	16 25 9	5 9 2	1 2 –	9 13 1	8 13 2
	Total	**170**	**114**	**48**	**16**	**3**	**23**	**23**
4	Foals: From sick and fallen animals, from fecal masses	60 90 20	19 36 11	3 6 1	2 3 2	– 1 –	2 7 3	1 1 –
	Total	**170**	**66**	**10**	**7**	**1**	**12**	**2**
	Total tested samples	680	445	155	56	12	72	62

Table 1: Variants of cultures selected from sick and fallen animals and from fecal masses of healthy animals

Item	Poultry species, from which samples were taken	Samples	Selected cultures				
			Salmonella	Escherichia	Klebsiella	Streptococci	Staphylococci
1	Chicken hens: From sick and fallen poultry, from fecal masses	50 75 5	86 25 11	34 17 6	3 2 1	8 2 2	9 4 3
	Total	**130**	**122**	**57**	**6**	**12**	**16**
2	Ducks: From sick and fallen poultry, from fecal masses	25 50 5	48 21 6	28 12 3	4 1 1	5 1 1	7 3 4
	Total	**80**	**75**	**43**	**6**	**7**	**14**
3	Geese: From sick and fallen poultry, from fecal masses	25 50 5	39 13 4	17 9 4	2 2 2	4 3 2	6 4 2
	Total	**80**	**56**	**30**	**6**	**9**	**12**
4	Turkeys: From sick and fallen poultry, from fecal masses	10 15 5	5 9 1	7 2 2	2 1 –	2 2 1	4 3 3
	Total	**30**	**15**	**11**	**3**	**5**	**10**
Total tested samples		320	268	141	21	33	52

Table 2: Variants of cultures selected from sick and fallen poultry and from fecal masses of healthy poultry

Salmonella; 14, Escherichia coli; 4, Klebsiella; 6, streptococci; and 12, staphylococci (Table 2).

The data given in Table 2 show that, in total, 515 cultures were selected from the said poultry, of which Salmonella was 52%; *Escherichia*, 27.4%; *Klebsiella*, 4.1%; streptococci, 6.4%; and staphylococci, 10.1%.

Conclusions

From the studies conducted for the determination of a degree of occurrence of enteroinfectious pathogens among the farm animals and poultry in some farms of the South Kazakhstan Almaty, Jambyl, Aktyubinsk, Qyzylorda, East Kazakhstan and Karaganda regions, it was found that the main enteroinfectious pathogens were 713 cultures of *Salmonella*, 54.6%; 296 cultures, 22.7%; 77 cultures of *Klebsiella*, 6.0%; and commonly occurring microorganisms in cases of different diseases: streptococci—8.0% (105 cultures) and staphylococci—8.7% (114 cultures).

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