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Prevalence of Intestinal Pathogens in Animals, Food Products of Animal Origin and in the Environmental Objects

Aida Bolatbekovna Abzhaliyeva, Kadyr Biyashevich Biyashev, Birzhan Kadyrovich Biyashev, Didar Maratovich Orazaliev, Manas Ramzanovich Turabekov, Ainura Abdigainievna Taipova

Kazakh National Agrarian University, Kazakhstan, 050002, Almaty, Abay 8

Abstract

Solving the problems of ensuring reliable and efficient animals' protection from infectious diseases, production of safe raw materials of animal origin, food products of high sanitary and veterinary quality is the area of fundamental and applied research for creating veterinary welfare in a particular region and in the whole country, and is important for maintaining the population health.

Keywords: prevalence, intestinal pathogens, food products, sanitary check, environment.

INTRODUCTION

Ensuring food safety of the population and providing healthy food products are important and urgent problems of national importance. Without solving them, there can be no social stability of the society, and health of the population. In recent years, due to the changing nature of the domestic market in the country, measures for integrating the economy of Kazakhstan into the world economy have been taken. In solving this important governmental problem, one should take into account the requirements of the environmental and sanitary supervision imposed upon Kazakhstan by the countries of the World Trade Organization [1,2,3].

Destruction of the industrial technologies in animal husbandry, divestiture of livestock farms, freedom of interregional and interstate movement of animals and slaughter products, and formation of the food market in Kazakhstan using imported raw materials and products of animal origin affect the efficiency of the traditional schemes of anti-epidemic supply in the regions, and the quality of the products of animal origin being sold [4,5,6].

Health of the people, their physical and intellectual development are determined by the social life conditions. In the group of various factors that characterize the standard of living (economic safety, working conditions, housing conditions, etc.) and influence morbidity, life expectancy and working capacity of the people, food and food products play the most important role.

The importance of the nutrition problem is manifested by the fact that on January 1, 2008, the newly adopted law of the Republic of Kazakhstan "On Food Safety" entered into force. The law consists of 6 chapters and 35 articles, and establishes the legal framework for ensuring food safety to protect life and health of people, legitimate interests of the consumers and environmental protection on the territory of Kazakhstan.

They are reflected in the concept of "Hazard Analysis and Critical Control Points" (HACCP) recommended by FAO, WHO, the International Commission on Microbiological Specifications of Food Products and the "Codex Alimentarius" Commission [7,8,9].

Therefore, the problem of food safety is economically the most important, and has very sharp social significance across the world. The decisive role in resolving it belongs to the state system of methods and procedures for monitoring safety indicators.

PURPOSE OF THE RESEARCH

The paper is aimed at studying the prevalence of intestinal pathogens in animals, food products of animal origin, and in environmental objects.

MATERIALS AND METHODS

The work was performed in the period between 2011 and 2017, on the basis of the anti-bacterial laboratory of biotechnology of the Kazakh National Agrarian University, and several farms in the Republic of Kazakhstan.

The work was performed with the use of the methods adopted in the international research practice, and was constantly improved through patent information studies.

In order to study the spread of intestinal pathogens in animals, and the etiology of poisoning with food products, various organs (liver, spleen, lungs, lymph nodes) taken from healthy slaughtered animals, samples of raw meat and meat products, milk and dairy products, chicken eggs, samples of fish and other products were used for bacteriological study.

Initial screening of cultures was performed based on the growth characteristics on media, and the microscopy of preparations taken from individual colonies. Morphological, cultural, biochemical properties of the culture were studied using the conventional methods. The isolated intestinal pathogens were identified according to the Bergey's Manual [10].

To study the properties of various types of intestinal pathogens, advanced certified and standardized biochemical, microbiological, and molecular biological studies were used.

For the purpose of mathematical processing of the results, standard methods of finding mean values and their errors were used.

RESULTS

With the purpose of determining the prevalence of intestinal pathogens, over 430 heads were studied (110 - of cattle, 120 - of sheep, 50 - of pigs, 50 - of horses, and 100 – of poultry) at various farms in the Republic of Kazakhstan.

Various organs from healthy slaughtered animals were taken for bacteriological examination.

Initial screening of the cultures was based on the growth on media and microscopy of preparations taken from individual colonies (beef-extract broth, meat infusion agar-agar, meat-and peptone liver agar, Endo medium, Ploskirev medium, Levin medium, Mueller medium, Kaufman medium).

The isolated intestinal infections were identified according to the Bergey's Manual.

As a result of studying the organs taken from healthy slaughtered animals, we isolated and identified 115 cultures of Salmonella, 45 - of Escherichia, 22 - of Staphylococcus and 5 - of Proteus, which in certain conditions could cause intestinal infections and diseases (Table 1).

Table 1. Variants of cultures isolated from farm animals and poultry

Type of animal	No. of animals studied	Kind of isolated cultures				Total isolated
		salmonella	escherichia	Staphylococcus	Proteus	
Cattle	110	38	16	6	2	62
Small cattle	120	31	7	5	-	43
Pigs	50	12	6	3	1	22
Horses	50	5	2	-		7
Poultry	100	29	14	8	2	53
Total animals examined	430	115	45	22	5	187

Table 2. Variants of cultures isolated from food products and environmental objects

Type of object	No. of studied samples	Kind of isolated cultures					Total isolated
		salmonella	escherichia	staphylococci	diplococci	Proteus	
Meat and meat products	150	61	28	14	6	3	114 25.1%
Dairy products	150	59	44	12	7	3	125 27.5%
Poultry meat	150	60	41	16	5	1	124 27.3%
Eggs (contents and washdowns)	100	30	15	3	1	-	49 10.7%
Fish meat	100	6	2	-	-	-	8 1.7%
Fodder	50	7	4	2	-	-	13 2.8%
Washdowns from milking machines	20	4	3	2			9 1.9%
Washdowns from the hands of the workers	20	5	4	3			12 2.6%
Total samples studied	740	232	141	55	19	7	454

Most of the intestinal infections isolated from animals were obtained from cattle and birds.

In solving the problems faced by the veterinary and public health authorities in preventing intestinal diseases, monitoring animal products and environmental objects plays an important role.

150 samples of raw meat and meat products, taken from the slaughterhouse during veterinary expertise; 150 samples of poultry meat, 100 samples of fish meat, and 100 eggs from the market; 150 samples of flask of milk and cream taken directly from a dairy farm, 50 samples of various kinds of fodder, 20 washdown samples from milking machines, 20 washdown samples from the hands of the workers (milkmaids) of the breeding complex were studied (Table 2).

As a result of studying food products and environmental objects, 232 cultures of Salmonella, 41 - of Escherichia, 55 - of Staphylococcus, 19 - of Diplococci and 7 - of Proteus were isolated. The results of the research showed that the most significant spread of intestinal pathogens was observed in dairy products and in meat of poultry (27.5% and 27.3%, respectively), in meat and in meat products (25.1%). Intestinal pathogens were detected in washdowns from equipment, hands and fodder.

CONCLUSION

As a result of studying the materials obtained from healthy slaughtered animals and from food products of animal origin and objects of the natural environment, we isolated and identified 347 cultures of Salmonella, 186 - of Escherichia, 77 - of Staphylococcus, 7 – of Streptococcus (Diplococcus), 12 – of Proteus, and 7 – of Streptococcus (Diplococcus), which could in certain conditions cause intestinal infections and toxic infections.

Detection of intestinal pathogens in food products, on hands of workers is a direct indication for organizing and taking focused, integrated actions for preventing spread of the pathogen both at facilities and at animal farms that are suppliers of products.

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