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Research article

## ASSESSMENT AND CLASSIFICATION OF FOOD PRODUCTS AS PER HEALTH RISKS CAUSED BY CHEMICAL AND MICROBIOLOGICAL CONTAMINATION

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*Our research goal was to reveal priority food products (FP) distributed on a regional consumer market as per health risks they caused for population.*

*The research was accomplished with statistic, analytical, and mathematical procedures as well as using comparative analysis procedure.*

*We analyzed laboratory data on sanitary-chemical and physical-chemical parameters collected over 2010–2019; our analysis revealed there were insignificant risks excluding FP contamination with nitrates. Special attention should be paid to microbiological contamination as overall parameters related to it remain steady over the compared 5-year periods. We also have detected unfavorable trends as average parameters have grown authentically over the last 5 years against 2010–2014 when it comes to fruit and vegetables, poultry, fish products, and alcoholic beverages with growth rates varying from 3.53 times to 1.44 times.*

*Having accomplished all the necessary calculations, we established that in Buryatia, just as in the Russian Federation in general, there were no food products that could cause extremely high health risks. But at the same time, the examined regional market had certain differences from the overall Russian one. High health risks were caused by poultry and it was not the case in the country in general. Bakery, confectionary, and fish products that caused high health risks in the country as a whole caused only significant risks in the region. Milk products also were assigned into a high risk category. We performed complex assessment and classified FP as per their quality and safety using health risk analysis methodology; it allowed us to determine priorities resulted from microbiological contamination of poultry and this fact is vital for population health in Buryatia.*

**Key words:** food products, chemical and microbiological contamination, quality and safety, health risk, classification, complex assessment, nutrition for population, regional peculiarities, Buryatia.

Protecting life and health of people who consume food products (FPs) should be given a priority over any economic interests of sole proprietors or juridical persons who deal with food products distribution. It is fixed in the last alterations to the Federal Law<sup>1</sup> «On food

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<sup>1</sup> On making alterations into the Federal law «On food products quality and safety» and into Clause 37 in the Federal Law «On education in the Russian Federation» No. 47-FZ issued on March 01, 2020. *KonsultantPlus*. Available at: [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_346666/](http://www.consultant.ru/document/cons_doc_LAW_346666/) (30.09.2020) (in Russian).

products quality and safety» and is a major principle of healthy nutrition [1–3]. An issue related to providing people with qualitative FPs is becoming more and more vital every year since its integral component, namely providing safety of food raw materials and finished products, is a basic factor that predetermines people's health and gene pool preservation. Required safety can be provided, among other things, via meeting Technical Regulations that are valid in the Customs Union and the Eurasian Economic Union [4–9].

Providing stability when it comes down to this factor is nowadays a most complicated and urgent task the civilization has to face and international organizations have to focus on [10]. Let us turn to certain official data provided by the WHO. In 2019 unsafe food products that contained malignant bacteria and carcinogens were estimated to cause more than 200 various diseases, from diarrhea to cancer. As per WHO estimates, 600 million people or almost each tenth person all over the world get sick after having consumed contaminated food products; 420 thousand people die annually due to food contamination and it results in 33 million years of health life being lost (DALY) [11].

Innovative technologies that are now used to produce and store FPs have substantially changed people's lifestyle and nutrition structure, first of all, in developed countries [12]. Nowadays people tend to consume more and more finished culinary products bought at catering facilities and in culinary shops; these food products are usually made according to strict technological and culinary procedures fixed for their cooking and storage; these technological processes and procedures involve substantial losses of essential (necessary) nutrients, first of all, certain vitamins and minerals as well as technical contaminants accumulating in food products [13]. In 2011, basic HACCP (Hazard Analysis and Critical Control Points) and a necessity to adhere to them were fixed in the EAEU legislation on technical regulation. But at the same time even when FPs manufacturing is controlled with HACCP princi-

ples being used all the manufactured products can acquire certain properties during their distribution on consumer market that can be hazardous for people's health and may in future result on communicable and non-communicable diseases [14]. Studies that involved assessing whether food products conformed to sanitary-epidemiologic requirements and ranking food products as per potential health risks they might cause have been accomplished in Moscow, Perm region, Primorye, Samara region, Orenburg region, Voronezh region, Tatarstan, Bashkortostan, etc. [4, 15–20]. This situation is typical not only for Russia but also for such developed countries as Sweden, the USA, Italy, France, Germany, etc. Although consumers in these countries are offered quite a wide range of FPs, morbidity caused by contaminated FPs is also rather high there [21–31]. But still, we haven't been able to find any works that focused not only on determining regional peculiarities of food products contamination but also on further ranking hazards and potential health risks that might occur due to FPs consumption. Scientific substantiation provided for periodicity and necessary volumes of sampling during scheduled inspections is another vital practical task.

Aim, in this study, was to reveal priority food products as per health risks they cause for population due to microbiological and chemical contamination. As an example we took a region located in the Far East Federal District; the region was a border one and there were certain regional peculiarities in nutrition structure and food products contamination there.

Data and methods. Data on food products contamination were provided by regional information funds within social and hygienic monitoring system of Buryatiya Region office of Federal Service for Surveillance over Consumer Rights Protection and Human Well-being, and the Center for Hygiene and Epidemiology, Buryatiya Regional Office. We analyzed research results obtained in 2010–2019 via laboratory tests that were performed on

157,440 food products samples collected randomly on consumer markets in Buryatiya. 89,921 samples were tested as per microbiological parameters; 27,266, sanitary-chemical ones; 16,460, parasitological ones; 17,974, physical and chemical ones; 1,204, radiological ones; 3,872 samples were tested to reveal any GMO traces in them, and 741 were tested in order to detect antibiotics in them. Results obtained via laboratory examinations were estimated according to the Customs Union Technical Regulations<sup>2,3,4,5,6</sup>. We calculated per cent and a share of examinations with results deviating from epidemiologic standards; shares were calculated from the overall number of examinations over each year and average value for 5-year periods (2010–2014 and 2015–2019).

Potential risks of damage to health due to people consuming specific food products (FPs) ( $R_{food}^1$ ) were calculated as per formulas (1, 2, 3) basing on data obtained from state departmental statistical reports, Form No. 18 «Data on a sanitary situation in an RF region» (section 8 «Hygienic characteristics of food raw materials and food products», issued in Buryatiya in 2017–2019; and «Consumption of basic food products by the population in the RF» state bulletin, section with data on Buryatiya. Health risks were estimated according to the Methodical guidelines<sup>7</sup>.

$$R_{food}^1 = \sum_i (p_i^1 \cdot u_i^1) \cdot W \quad (1)$$

where  $p_i^1$  is frequency (probability) that obligatory safety requirements to FPs will be violated as per i-th hazard factor during one inspection;

$u_i^1$  is relative damage to health caused by violated sanitary-epidemiologic requirements to i-th hazard factor of FPs according to Appendix No. 3 to the Methodical guidelines;

$W$  is a coefficient that characterizes regional peculiarities related to various FPs consumption.

$$p_i^1 = m_i / n_i \quad (2)$$

where  $m_i$  is a number of FPs examinations per year with results showing that i-th factor deviates from the standards;

$n_i$  is an overall number of i-th factor examinations per year.

$$W = V / V_{RF} \quad (3)$$

where  $V$  is actual annual FPs consumption per one person living in Buryatiya (kg/year, L/year, units/year);

$V_{RF}$  is average annual FPs consumption per one person in Russia (kg/year, L/year, units/year).

Research results were statistically processed with «Statistica v. 10.0» software package according to conventional procedures. Results were given as simple means with 95 % confidence interval (CI). Comparisons were accomplished as per Student's t-test for the above given 5-year periods.

**Results and discussion.** Over the analyzed period, namely 2010–2019, in Buryatiya a share of FPs deviating from hygienic standards as per microbiological parameters amounted to 4.06 % on average (3.86; 4.26); as per sanitary-chemical parameters, 4.71 % (4.09; 5.33); as per parasitological parame-

<sup>2</sup> CUTR 021/2011. On food products safety. *KODEKS: an electronic fund for legal and reference documentation*. Available at: <http://docs.cntd.ru/document/902320560> (30.09.2020) (in Russian).

<sup>3</sup> CUTR 023/2011. Technical regulations for juice products made of fruit and vegetables. *KODEKS: an electronic fund for legal and reference documentation*. Available at: <http://docs.cntd.ru/document/902320562> (30.09.2020) (in Russian).

<sup>4</sup> CUTR 024/2011. Technical regulations for butter and fat products. *KODEKS: an electronic fund for legal and reference documentation*. Available at: <http://docs.cntd.ru/document/902320571> (30.09.2020) (in Russian).

<sup>5</sup> CUTR 033/2013. On safety of milk and milk products. *KODEKS: an electronic fund for legal and reference documentation*. Available at: <http://docs.cntd.ru/document/499050562> (30.09.2020) (in Russian).

<sup>6</sup> CUTR 034/2013. On safety of meat and meat products. *KODEKS: an electronic fund for legal and reference documentation*. Available at: <http://docs.cntd.ru/document/499050564> (30.09.2020) (in Russian).

<sup>7</sup> MR. Classification of food products distributed on the market as per risks of damage to health and property losses borne by consumers used for organizing scheduled control and surveillance activities. Approved by the Order issued by Rospotrebnadzor on January 18, 2016 No. 16. Available at: <http://base.garant.ru/71313192/53f89421bbdaf741eb2d1ecc4ddb4c33/> (30.09.2020) (in Russian).

ters, 0.10 % (0.07; 0.14); as per physical-chemical parameters, 7.57 % (6.92; 8.22); antibiotics, 0.40 % (0.17; 0.64). Inspections didn't reveal any GMO contents exceeding 0.9 % or radioactive substances in concentrations higher than hygienic standards. There was a stable number of FPs samples that didn't conform to relevant regulations (Table 1).

Overall, there were no statistical discrepancies in a number of FPs samples containing chemical or microbiological contaminants in 2015–2019 against 2010–2014 ( $p > 0.05$ ). The only exceptions were 2 parameters, namely, shares of FPs samples deviating from hygienic standards as per sanitary-chemical and physical-chemical parameters where statistical discrepancies were authentic ( $p \leq 0.01$ ).

When analyzing results of FPs assessment as per sanitary-chemical parameters over a 10-year period, we revealed that a peculiar feature was FPs deviating from hygienic standards due to fruits and vegetables being contaminated with nitrates (potatoes, vegetables and melons). In 2010–2019 nitrates contents in these products were higher than hygienic standards on average in 5.55 % (5.06; 6.05). Specific share of samples with elevated nitrates contents went down by 1.47

times in 2015–2019 against 2010–2014, from 6.37 % (5.63; 7.12) to 4.32 % (3.92; 4.72); however, these discrepancies were not statistically significant ( $p > 0.05$ ).

There were no FPs samples deviating from hygienic standards as per other sanitary-chemical parameters detected over the analyzed period. The only exceptions were the last two years when inspections revealed sporadic elevated toxic Pb and Cd contents in FPs. Average value of this parameter amounted to 0.05 % in 2010–2019. Sporadic deviations from hygienic standards were detected in 2018 in «biologically active additives» FPs category in 2018, 0.16 % of the overall number of examined samples; in 2019 there were 0.15 % samples of «milk and milk products» deviating from hygienic standards as per this parameter. Accordingly, these small values allow treating these revelations as «accidental ones».

There was 1.75 times decrease in a share of iodized salt with iodine contents being lower than stated by a manufacturer in 2015–2019 against 2010–2014; it amounted to 2.0 % (1.85; 2.15) and 3.49 % (2.92; 4.06) accordingly but discrepancies were not statistically significant ( $p > 0.05$ ).

Table 1

## Results of food products examinations in 2010–2019

Parameters	Percent of samples deviating from hygienic standards (simple means and CI), %			Statistical significance of discrepancies ( $p$ )
	2010–2014	2015–2019	2010–2019	
Sanitary-chemical parameters including	5.97 (5.33; 6.61)	2.57 (2.43; 2.71)	4.71 (4.09; 5.33)	$p \leq 0.01$
Heavy metals (Pb, As, Cd, Hg)*	0.00	0.08 (0.05; 0.12)	0.05 (0.01; 0.08)	$p > 0.05$
Iodine	3.49 (2.92; 4.06)	2.0 (1.85; 2.15)	2.79 (2.49; 3.09)	$p > 0.05$
Nitrates	6.37 (5.63; 7.12)	4.32 (3.92; 4.72)	5.55 (5.06; 6.05)	$p > 0.05$
Physical-chemical parameters	8.89 (8.24; 9.55)	5.43 (5.21; 5.66)	7.57 (6.92; 8.22)	$p \leq 0.01$
Microbiological parameters	3.98 (3.67; 4.29)	4.15 (3.92; 4.38)	4.06 (3.86; 4.26)	$p > 0.05$
Pathogenic microorganisms including <i>Salmonellas</i>	0.17 (0.13; 0.21)	0.31 (0.20; 0.41)	0.23 (0.13; 0.34)	$p > 0.05$
Parasitological parameters	0.18 (0.12; 0.24)	0.02 (0.00; 0.05)	0.10 (0.07; 0.14)	$p > 0.05$

Note: \* means that examinations revealed Pb and Cd contents.

Over recent years closer attention has been paid to testing whether food products conform to requirements fixed in regulatory documents as per physical-chemical parameters. A specific share of FPs that deviated from hygienic standards as per this parameter amounted to 5.43 % on average in 2015–2019 (5.21; 5.66) and it was authentically 1.64 times lower than in previous 5 years when it amounted to 8.89 % (8.24; 9.55) ( $p \leq 0.01$ ).

Microbiological FPs contamination didn't change in the compared periods. Thus, in 2010–2014 a share of FPs that deviated from hygienic standards as per microbiological parameters amounted to 3.98 % (3.67; 4.29); in 2015–2019, 4.15 % (3.92; 4.38) and these discrepancies were not statistically significant ( $p > 0.05$ ). High specific weight of FPs samples deviating from hygienic standards as per microbiological parameters was detected in several product groups over the examined years; thus, it amounted to 9.53 % (8.76; 10.31) in «milk and milk products» group; 6.88 % (5.96; 7.80); «fish, non-fish hunting

objects and products made of them»; 6.21 % (3.25; 9.18), «fruits and vegetables»; 5.89 % (4.98; 6.81), «alcoholic beverages»; 5.79 % (5.52; 6.07), «bakery and confectionary»; 4.96 % (4.72; 5.20), «meat and meat products»; 4.90 % (3.96; 5.83), «poultry, eggs, and products made of them»; 3.32 % (3.09; 3.55), «culinary products». Average parameters authentically increased in 4 FPs groups in the 2<sup>nd</sup> period against the 1<sup>st</sup> 5 years, namely, they grew by 3.53 times in «fruits and vegetables» group; by 3.0 times, «poultry, eggs, and products made of them»; by 1.82 times, in «fish, non-fish hunting objects and products made of them» and «biologically active additives» (BAA) (Table 2). There was no authentically significant increase or decrease in other FPs groups.

There was a slight increase in a share of FPs samples that deviated from hygienic standards as per contents of pathogenic microorganisms over the analyzed period as it amounted to 0.31 % (0.20; 0.41) in 2015–2019 against 0.17 % (0.13; 0.21) in 2010–2014.

Table 2

Results of microbiological inspections of specific food product groups over 2010–2019

Food raw materials and food products	Percent of samples deviating from hygienic standards (simple means and CI), %			Statistical significance of discrepancies ( $p$ )
	2010–2014	2015–2019	2010–2019	
Meat and meat products	4.73 (4.26; 5.20)	5.35 (4.81; 5.89)	4.06 (3.93; 4.19)	$p > 0.05$
Poultry, eggs, and products made of them	2.52 (1.94; 3.10)	7.55 (5.06; 10.04)	4.90 (3.96; 5.83)	$p \leq 0.01$
Milk and milk products	10.56 (8.52; 12.59)	8.36 (7.41; 9.30)	9.53 (8.76; 10.31)	$p > 0.05$
Fish, non-fish hunting objects and products made of them	5.25 (4.37; 6.13)	9.55 (7.19; 11.90)	6.88 (5.96; 7.80)	$p \leq 0.01$
Bakery and confectionary	6.22 (5.75; 6.70)	5.12 (4.51; 5.72)	5.79 (5.52; 6.07)	$p > 0.05$
Fruits and vegetables	3.92 (2.63; 5.21)	13.82 (6.37; 21.27)	6.21 (3.25; 9.18)	$p \leq 0.01$
Culinary products	2.92 (2.34; 3.49)	3.48 (3.11; 3.86)	3.32 (3.09; 3.55)	$p > 0.05$
Butter and fats	1.46 (0.83; 2.10)	2.51 (1.67; 3.35)	1.99 (1.63; 2.35)	$p > 0.05$
Alcoholic beverages	4.97 (3.56; 6.37)	7.14 (4.85; 9.44)	5.89 (4.98; 6.81)	$p > 0.05$
Non-alcoholic beverages	0.84 (0.65; 1.04)	1.93 (0.90; 2.95)	1.17 (0.82; 1.53)	$p > 0.05$
BAA	0	3.18 (1.36; 5.0)	2.81 (-1.09; 6.71)	$p \leq 0.01$

Table 3

Dependence between percentage of non-standard samples and a number of observations by parameters (in 2010–2019)

Parameters ( $y$ )	Dependence on a number of examinations ( $x$ )	Approximation coefficient	$p$
Sanitary-chemical	$y = 0.09x - 126.55$	$R^2 = 0.89$	$=0.32$
Physical-chemical	$y = 0.12x - 86.47$	$R^2 = 0.85$	$=0.33$
Microbiological	$y = 0.03x + 75.08$	$R^2 = 0.24$	$=0.10$
Salmonella*	$y = 0.9928x - 0.2543$	$R^2 = 0.99$	$=0.35$
Parasitological	$y = 0.01x - 18.35$	$R^2 = 0.37$	$=0.02$

Note: \* means a number among FP samples containing pathogenic microorganisms in elevated quantities deviating from hygienic standards.

5 FPs groups were the most hazardous in this respect as they contained pathogenic microorganisms in quantities being higher than hygienic standards. These groups were «poultry, eggs, and products made of them», 3.77 % (2.81; 4.73); «fruits and vegetables», 1.62 % (–2.51; 5.75); «meat and meat products», 0.85 % (0.76; 0.94); «culinary products», 0.07 % (0.05; 0.09); «bakery and confectionary», 0.05 % (0.04; 0.07).

We analyzed dynamics in these parameters and revealed an increase in a share of FPs samples with pathogenic microorganisms' contents deviating from hygienic standards in 2015–2019 against the previous 5 years. The greatest increase was revealed in «poultry, eggs and products made of them» FPs group and amounted to 3.5 times. A share of such samples grew from 0 to 6.78 % in «fruits and vegetables» FPs group. The situation with pathogenic microorganisms was rather stable in «meat and meat products» FPs group and «culinary products» FPs group and there were no authentic discrepancies between the compared periods: 0.77 % (0.64; 0.89) in 2010–2014 and 1.0 % (0.76; 1.23) in 2015–2019; 0.06 % (0.01; 0.11) in 2010–2014 and 0.08 % (0.04; 0.12) in 2015–2019 accordingly.

It was established that in 2015–2019 a share of FPs that contained salmonella amounted for 99.17 % (98.73; 99.60) among FPs samples with detected pathogenic microorganisms in them that were not allowed according to hygienic standards; it was higher

than the same parameter in 2010–2014 when it amounted to 96.34 % (94.71; 97.98).

We applied linear approximation to analyze results obtained via FPs examinations aimed at revealing their conformity with hygienic standards as per sanitary-chemical, microbiological, parasitological, and physical-chemical parameters in 2010–2019. It allows predicting frequency of non-standard samples. As it is shown in Table 3, approximation coefficient is close to 1.0 for sanitary-chemical and physical-chemical parameters and it indicates that the more FPs samples are examined the more samples that deviate from hygienic standards are to be expected.

In its turn  $R^2 = 0.24$  and  $0.37$  for microbiological and parasitological parameters accordingly and it means there is no such dependence. It confirms that detection of FPs samples that deviate from hygienic standards as per microbiological and parasitological parameters depends not only on overall number of FPs examinations as per these parameters. We can predict that a further growth in a number of examinations aimed at estimating FPs as per these criteria during scheduled inspections will not result in more frequently detected violations of hygienic requirements. Approximation coefficient is practically equal to 1.0 for salmonella detection. It means there is a direct correlation with a greater number of FPs samples containing pathogenic microorganisms in quantities deviating from hygienic standards and we can predict more fre-

quent detection of samples containing this pathogen.

Our next task was to assign FPs to a certain category as per risks of causing damage to consumers' health taking into account regional peculiarities regarding food consumption. To do that, we calculated risks of damage to health due to people consuming food products that didn't conform to safety requirements. The results are given in Table 4 and compared with data obtained for the country as a whole [14].

These data indicate that risks associated with chemical contamination are insignificant excluding FPs contamination with nitrates. When it comes down to microbiological contamination, there seems to be a stable situation with it on the consumer market in Buryatiya but in spite of it certain FPs groups are to be paid closer attention, namely «poultry, eggs and products made of them» and «fruits and vegetables». There was a 3.5 times growth, from  $1.75 \cdot 10^{-2}$  in 2010–2014 to  $6.12 \cdot 10^{-2}$  in 2015–2019 in average probability that obligatory safety requirements to poultry products might be violated due to elevated quantities of

pathogenic microorganisms; the same parameters grew also for fruit and vegetables, from 0 to  $6.78 \cdot 10^{-2}$  accordingly. Our analysis of approximation coefficients allowed us to predict greater frequency of detected salmonella due to growth in number of FPs samples containing pathogenic microorganisms in quantities exceeding hygienic standards.

We should note that there was a change in the structure of detected serologic salmonella types over the second 5-year period as there was a slight growth in quantity of detected salmonella belonging to group S (*S. Infantis*). It is well in line with data obtained by P. Antunes [et al.] on a significant decrease in *S. Enteritidis* quantities and a growing number of serotypes that are more adaptable and more resistant to antibiotics, such as *S. Infantis*, *S. Kentucky* etc. [32]. But at the same time, according to data given by T. Oscar in a model he developed, prevalence of salmonella didn't correlate ( $r = -0.39$ ;  $p = 0.21$ ) with a risk that salmonellosis might occur. That risk was influenced by other factors such as quantity of salmonella; their virulence; how often and to what extent poultry meat was poorly cooked;

Table 4

Classification of food products, according to health risks due to consumption by the population living in Republic of Buryatiya

Food products group	Buryatiya			Potential health risk category / Hazard category for damage to health in the Russian Federation [14]
	coefficient that characterizes regional consumption ( <i>W</i> )	potential health risk ( <i>R</i> )	Potential health risk category / Hazard category for damage to health in the examined region	
Poultry, eggs and products made of them	0.88	$1.54 \cdot 10^{-2}$	High / 2 category	Significant / 3 category
Bakery and confectionary	1.16	$3.97 \cdot 10^{-3}$	Significant / 3 category	High / 2 category
Fish and fish products	0.91	$2.82 \cdot 10^{-3}$	Significant / 3 category	High / 2 category
Milk and milk products	0.78	$1.58 \cdot 10^{-3}$	Significant / 3 category	Significant / 3 category
Meat and meat products	0.75	$7.21 \cdot 10^{-5}$	Average / 4 category	Significant / 3 category
Potato	1.44	$2.76 \cdot 10^{-4}$	Average / 4 category	Moderate / 5 category
Culinary products*	0.94	$2.46 \cdot 10^{-4}$	Average / 4 category	Significant / 3 category
Butter and fats	0.80	$2.17 \cdot 10^{-4}$	Average / 4 category	Moderate / 5 category
Vegetables	0.70	$1.30 \cdot 10^{-5}$	Moderate / 5 category	Moderate / 5 category
Canned food*	1.0	$1.44 \cdot 10^{-5}$	Moderate / 5 category	Significant / 3 category
BAA*	0.70	$1.41 \cdot 10^{-5}$	Moderate / 5 category	Moderate / 5 category

Note: \* means that *R* as potential health risk caused by people consuming a specific food product is calculated as per mean values obtained from Section 8 in the Statistical Report Form No. 18 over 2017–2019.

consumer behavior when cooking and eating poultry meat; and a particular person's resistance to the pathogen. All this combined determines a necessity to apply a more integral approach involving technological and behavioral risks assessment and is in line with data obtained by E. Lambertinia [et al.], Y. Cui [et al.] [33–35].

Having calculated potential health risks caused by people consuming a specific food products we established that there were no food products categorized as extremely risky in Buryatiya, just as it was the case with the country in general [14]. But still, there were certain difference detected on the regional consumer market against the data obtained for the country as a whole. Thus, «poultry, eggs and products made of them» FPs group caused high health risks due to microbiological contamination with pathogens (detected salmonella), whereas there were no such risks detected in the country on average. Given that, this product group is subject to obligatory control in 100 % cases as per a list of factors determined via previous inspections performed at economic entities. Bakery and confectionary, fish and fish products that were determined as causing high health risks in the Russian Federation caused only significant health risks on the examined regional market. Besides, significant risks were caused by «milk and milk products» FPs group. Average risks that required control in 50 % cases during scheduled inspections performed at economic entities included such FPs groups as «meat and meat products», «potato», «butter and fats», and «culinary products». According to calculated data, vegetables, canned food and BAA cause only moderate risks and require control in 10 % cases. The remaining products

groups caused low health risks and were assigned into FPs category that required only documentary control in case there were time and labor resources to perform it.

**Conclusion.** We accomplished complex assessment of FPs quality and safety; it allowed us to classify food products as per health risks they caused with determining certain priorities. The results are vital for public health preservation in Buryatiya. In case there is a growth in number of targeted FPs examinations, we predict more frequently detected violations of hygienic requirements as per sanitary-chemical and physical-chemical parameters. The greatest health risk for population is caused by microbiological contamination of poultry products distributed on the regional market.

Given that, it is necessary to continue monitoring activities together with veterinary services aimed at providing food products safety and animals' health; it is also necessary to pursue a «restraining strategy» aimed at minimizing microbiological contamination and reducing salmonella transfer along food chains (from primary manufacture to consumption).

Food products trade on the global scale involves growing consumer demand for poultry meat on regional markets, especially in countries with low and middle incomes. This, together with this products being widely promoted by mass media, can make for low quality and potentially hazardous products penetrating the consumer market in Buryatiya; in future it can result in a deteriorating epidemiological situation.

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