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THE EFFICIENCY OF RISK ASSESSMENT AT FRESH MEAT PAVILIONS BASED ON DATA OF HYGIENIC INDICES

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Keywords: risk assessment, hygienic indicator, fresh meat

Introduction. The efforts of food safety authorities in any country are ultimately designated to ensure selling such food products which would not threaten the health and lives of consumers in case of intentional consumption (Federal Institute for Risk Assessment, 2011).

Home slaughtering of cattle and poultry widely practiced in the Republic adds to food pollution risk, thus making fresh meat market particularly attractive from the viewpoint of food safety (RA Government Decision №1560-N). Commonly, the residents of Yerevan buy freshly slaughtered meat from markets, some of which are known not only as major meat selling places, but also as a raw meat supply source to a number of processing factories and for catering.

The goal of this research was to assess the risk posed by meat selling outlets in the three selected markets (industrial risk) and to synchronously collate between risks of hygienic indicators (bacteriological indices) of meat by-product samples (food-borne risk) collected from the noted markets (Guidelines on HACCP, 2005).

The study object and method. The research covered 35 meat selling outlets or pavilions scattered in the three markets operating in different districts of Yerevan: N2 (GUM), N5 (Komitas) and N7 (Nor Nork) and their selection as study objects was conditioned by the fact of being the biggest and the most attended ones. Following State Standard (GOST) 51447-99 (RF), we sampled solely fresh meat (State Standard 51447-99). As a research method to assess the risk posed by the selected meat selling outlets, we employed method which enjoys wide application in the EU countries (AICQ, 1996, Manzone, 2003). A quantitative value of risk dimensions was calculated by the formula below:

$$R=P*G/K,$$

where R is dimensions of risk, P – probability of occurrence of undesirable events with certain periodicity, G – dimensions or magnitude of harm, K – coefficient of correction which means the extent to which the staff of food operators understand informational, educational, sanitary and hygienic actions. Knowledge of values of risk variables is essential to qualitatively assess risks. The algorithm for calculation of risk dimensions rests on the knowledge of P and G variables (the values of which vary from 1 to 4) and K – coefficient of correction (values varying from 0.5 to 1.5), (Manzone, 2003, Maria, 2002). The obtained risk assessment data helped to single out four basic levels of risk (Figure 1).

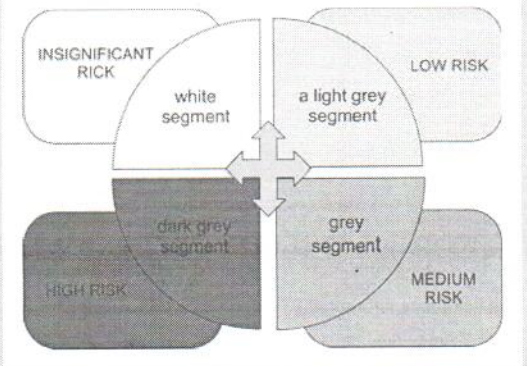

Figure 1. Risk Segments

With regard for the level of compliance with the accepted requirements the study site was conventionally divided into three categories described below in Table 1.

Discussion. As the research advanced, we carried out quantitative calculation of risk dimensions: Category A: R=4x3/0.5=24, Category B: R=3x3/0.5=18, Category C: R=3x3/1=9

Description of Categories. Category A: We evaluated that P equals to 4 which means that the probability of the occurrence of an undesirable event is realistic. **Category B and C**: P=3 – probability of occurrence of an undesirable event is high owing to the lack of temperature control and proper disinfection procedures.

Categories A, B and C: Indices regulated by regulatory safety standards acts are G=3 meaning that the intensity of hazard is high: a

consequence of adverse impacts upon consumers is manifested in the form of gastrointestinal disorders which are treated therapeutically with synchronous procedure of isolation of the causative agent of the disease.

Table 1. Volume Weight and Description of Meat Selling Outlets or Pavilions

Category	*Volume weight/ share* of the noted category in the market place, %	Description
A	60	The pavilion wasn't tiled properly, no temperature control, no disinfection procedures. Salesmen were unaware of job requirements.
B	30	The pavilion wasn't tiled, no temperature control, no disinfection procedures. Salesmen were poorly informed about job requirements.
C	10	The pavilion was tiled, temperature regime kept, disinfection done through washing. Salesmen kept to the job requirements.

Category A and B: K=0.5. The level of understanding of informational, educational, sanitary and hygienic actions by the staff of food operators, is unsatisfactory, i.e. a probability of foodstuff pollution both environment-induced and on the part of the staff, is high. In **Category C** outlets are evaluated to be K=1, as the level of understanding of informational, educational, sanitary and hygienic actions is satisfactory yet not comprehensive. The results obtained are visualized in risk matrices below (Tables 2 and 3).

Table 2. Risk Matrix at K=0.5

P = probability

4	8	16	24	32
3	6	12	18	24
2	4	8	12	16
1	2	4	6	8
	1	2	3	4

G = magnitude

Table 3. Risk Matrix at K=1

P = probability

4	4	8	12	16
3	3	6	9	12
2	2	4	6	8
1	1	2	3	4
	1	2	3	4

G = magnitude

Category A, high risk zone **Category B, medium risk zone** **Category C, medium risk zone**

The yielded bacteriological data are generalized in Table 4.

Results. As it can be seen from the carried out calculations and Table 4, Category A selling outlets or pavilions are shown as a dark grey segment of the risk matrix, .whereas data on bacteriological indices indicate excessive quantities of microorganisms in all the meat selling outlets or pavilions. L. monocytogenes are detected, moreover, food products are infested by maggots. It is suggested that either protective or preventive measures should be implemented, otherwise the products should be inappropriate for use. Category B and C pavilions are represented by a grey segment of risk matrix, whereas bacteriological data indicate that besides excessive quantities of microorganisms MAFAM (TBC), Escherichia coli, too, is detected. It is suggested that either protective or preventive measures should be implemented, otherwise the product should not be appropriate for use.

Table 4. Bacteriological Indices Corresponding to the Category of Selling Outlets

Type of indices	Index value			
	According to the legal act	Factual		
		Category A	Category B	Category C
MAFAM (TBC)	Max. $1x10^3$ GAM/g	$5x10^8$	$1x10^8$	$2x10^5$
Escherichia coli	Unacceptable in 0.1g of meat	+	+	+
Pathogenic microorganisms incl. salmonellae	Unacceptable in 25g of meat	-	-	-
L. monocytogenes	Unacceptable in 25g of meat	+	-	-
Additional	-	Infested by maggots	-	-

Conclusions. The results obtained allow us to conclude that:

1.The internationally accepted risk assessment method is efficient and helps to assess industrial risk without any sampling;

2.Industrial risk posed by fresh meat selling outlets or pavilions is reflected in food-borne risk;

3.Sanitary and hygienic conditions of fresh meat selling are at high and medium risk level and disagree with hygienic requirements to the fresh meat selling.

4.The major reason of occurrence of fresh meat-induced diseases and intoxication is the lack of Good Hygienic Practice (GHP).

With a view of the improvement of the current situation, it is necessary to put into practice risk assessment based system of control that would meet international criteria and implementing GHP program in respect to meat selling outlets that would help to produce safe and high quality food products.

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ЭФФЕКТИВНОСТЬ ОЦЕНКИ РИСКОВ В ПУНКТАХ РЕАЛИЗАЦИИ СВЕЖЕГО МЯСА ПО ДАННЫМ ГИГИЕНИЧЕСКИХ ИНДИКАТОРОВ

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Целью данной работы является оценка рисков в пунктах реализации мяса по данным гигиенических индикаторов и микробиологических показателей на трех крупнейших рынках г. Еревана. Результаты исследований показали, что, основываясь на оценке рисков, можно выявить степень опасности без проведения лабораторных исследований. Для нормализации существующих проблем необходимо внедрить программы, которые базируются на оценке рисков, а в пунктах реализации мяса и мясопродуктов – дополнительную программу Good Hygienie Practice.

ԹԱՐՄ ՄՍԻ ԻՐԱՑՄԱՆ ԿԵՏԵՐՈՒՄ ՌԻՍԿԵՐԻ ԳՆԱՀԱՏՄԱՆ ԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅՈՒՆԸ ՀԻԳԻԵՆԻԿ ՑՈՒՑԱՆԻՇՆԵՐԻ ՏՎՅԱԼՆԵՐՈՎ

Դ.Ա. Պիպոյան, Մ.Գ. Մուրադյան, Ա.Ս. Աբրահամյան
Սննդի շղթայի ռիսկերի գնահատման տեղեկատվավերլուծական կենտրոն

Սույն հետազոտության նպատակն է գնահատել Երևանի երեք խոշորագույն շուկաներում թարմ մսի իրացման կետերի ռիսկերն ըստ հիգիենիկ ինդիկատորների տվյալների և միկրոբիոլոգիական ցուցանիշների:

Հետազոտության արդյունքում պարզվել է, որ վերը նշված եղանակով, առանց լաբորատոր հետազոտության անցկացման կարելի է որոշել վտանգավորության աստիճանը: Առկա խնդիրները լուծելու նպատակով անհրաժեշտ է շուկաներում ներդնել ռիսկերի գնահատման վրա հիմնված ծրագրեր, իսկ մսի և մսամթերքի իրացման կետերում՝ լրացուցիչ ծրագիր՝ Good Hygienic Practice: