IMPLICATIONS OF THE SANITARY CONDITION OF THE FOOD UNITS ON THE WATER QUALITY

Oneț Cristian *

University of Oradea-Faculty of Environmental Protection cristyonet@yahoo.com

Abstract

Sanitation is the hygienic means of promoting health through prevention of human contact with the hazards of wastes as well as the treatment and proper disposal of sewage wastewater. Most pathogens that can contaminate water supplies come from the feces of humans or animals. The public health importance of using potable water in food industry and the implications of the sanitary condition of the food units on the water quality are the major issues. Testing drinking water for all possible pathogens is necessary. The results of microbiologycal analysis presented in this paper suggest a coliform contamination of drinking water derived from the tap water coming into the milk and meat processing plants.

Key words: water, quality, hygiene, microorganisms.

INTRODUCTION

Wastes that can cause health problems include human and animal feces, solid wastes, domestic wastewater (sewage, sullage, greywater), industrial wastes and agricultural wastes.

Traditionally, the food-processing industry has been a large water user. Water is used as an ingredient, an initial and intermediate cleaning source, an efficient transportation conveyor of raw materials, and the principal agent used in sanitizing plant machinery and areas. Although water use will always be a part of the food-processing industry, it has become the principal target for pollution prevention, source reduction practices (www.mcilvainecompany.com).

In food processing plants, water is used for many purposes. Its use starts with conditioning raw materials, such as soaking, cleaning, blanching, and chilling. It continues with cooling, sanitizing, steam generation for sterilization, power and process heating, and finally, direct 'in-process' use. The water classification categories used in the food and beverage industries are: general purpose, process, cooling and boiler feed (www.mcilvainecompany.com).

Microorganisms commonly used as indicators of water quality include: coliforms, faecal streptococci, *Clostridium perfringens*, and *Pseudomonas aeruginosa*.

MATERIAL AND METHODS

The researches were carried out in 2011 and 2012. The potable water samples were collected from milk and meat processing factories. The monitored food units are placed in Bihor County. To study the microbiological quality of potable water used in both food units, water samples were collected from the tap water coming into the milk and meat processing plants.

Microbiological analysis consisted in the determination by plate count method on selective medium the numbers of mesophilic bacteria, coliform and faecal streptococci. The specific culture media used were: nutrient agar for bacterial count, Macconkey agar for coliform count and brain-heart infusion for faecal streptococcus count. The specific culture media were sterilized in an autoclave at 121^0C for 15 minutes. The colonies formed were counted using colony counter and expressed as colony-forming units per milliliter (cfu/ml) of the sample.

RESULTS AND DISCUSSION

On microbiological selective medium, using the plate method, the number of colony forming units (cfu) of mesophilic bacteria, coliform and faecal streptococcus were determined. The results of microbiological analysis of potable water samples are presented in the following. Numerical results of analysis are expressed in tables and are compared with the maximum limits set by into force legislation.

Table 1

Monitoring control of potable water collected from the tap water coming into the milk processing plants

Crt. nr.	Microbiologycal indicators	Results of analysis Mean Bacterial, Coliform and Faecal Streptococcus Counts (Cfu/Ml)					Acceptable value for potable water
		I 06.07.2011	II 05.10.2011	III 11.01.2012	I V 05.04.2012	V 05.07.2012	
1	bacteria count	0	0	0	0	0	20
3	coliform count	0	700	2300	3200	2100	none
4	faecal streptococcus count	0	0	0	0	0	none

The results of microbiologycal analysis presented in table 1 suggest a faecal contamination of potable water with coliform bacteria derived from

the input tap of milk processing factory because the number of coliforms is higher comparative with the acceptable value.

Table 2

Monitoring control of potable water collected from the tap water coming into the meat processing plant

Crt. nr.	Microbiologycal indicators	Results of analysis Mean Bacterial, Coliform and Faecal Streptococcus Counts (Cfu/Ml)					Acceptable value for potable water
		I 06.07.2011	II 05.10.2011	III 11.01.2012	I V 05.04.2012	V 05.07.2012	
1	bacteria count	0	0	10	18	15	20
3	coliform count	0	0	300	149	0	none
4	faecal streptococcus count	0	0	0	0	0	none

The results presented in table 2 shows that coliform bacteria were identified in a certain samples collected from meat processing factory. The bacteria count suggest also a small impurification with microorganism although the number registered did not exceed acceptable limits.

Potable water used in food industry should not contain any organism of faecal origin. The sanitary quality of potable water is determined primarily by the kinds of microorganisms present rather than by the microbial count. The potential source of coliform bacteria in water supplies result from sub-optimal operation of water treatment processes or ingress of contamination from breaches in the integrity of the distribution system.

Coliform bacteria can be present in domestic plumbing systems with kitchen taps and sinks being recognised sources of these organisms.The water company and health authority and local authority will need to consider the issue of advice and guidance.

CONCLUSIONS

The result of this study shows that certain samples from the monitored milk and meat factory were microbial contaminated with coliforms while other potable water samples were included in the permissible limits. For the nonce more water samples will be taken to find and eliminate potential contamination sources, and chlorination of the system will most likely occur.

REFERENCES

1. American Public Health Association, APHA, 1995, Standard methods for the examination of water and wastewater, 19th Ed, APHA, Washington D.C.
2. Banu C., 2002, Food Industry Engineer Book, Tehnical Publishing House, Bucharest; Bara V. Oneţ C., 2008, Hygiene Guide in Food Units, University of Oradea Publishing House.
3. Bonde, G. J., 1977, "Bacterial indication of water pollution" In: Advances in Aquatic Microbiology, Academic Press, London.
4. Hobbs Betty C., Roberts D., Food Poisoning and food Hygiene, 6 edition, Arnold, 2001.
5. McKnight, S., 2002, Issues on Water Quality and Safety, Dairy, Food and Environmental Sanitation, p. 512-513.
6. Oneţ Aurelia, 2011, Activitatea microbiologică în agrocenozele şi cenozele naturale din Câmpia Crişurilor, Editura Universităţii din Oradea.
7. Oneţ Aurelia, Oneţ C,, 2011, Testing of the hygienic quality of the carbonated soft drinks, Analele Universitati din Oradea, Fascicula Protectia Mediului, vol. XVII, Anul 16, Editura Universităţii din Oradea.
8. Oneţ Aurelia, 2012, Environmental management, University of Oradea Publishing House.
9. Oneţ Cristian, Oneţ Aurelia, 2006, Igiena unităţilor alimentare:lucrări practice, Editura Universităţii din Oradea.
10. Oneţ Cristian, Oneţ Aurelia, 2010, Monitoring of the untreated wastewater quality produced by food industry, Natural Resources and Sustainable Development, University of Oradea Publishing House.
11. Oneţ C., Oneţ Aurelia, 2011, Management of the wastewater discharged by the milk and meat processing factories, Analele Universitati din Oradea, Fascicula Protectia Mediului, vol. XVI, Anul 16, Editura Universităţii din Oradea.
12. Oneţ, Cristian, Comparative assessement of hygiene quality of potable water used in food industry, 2011, Analele Universităţi din Oradea, Fascicula Ecotoxicologie, Zootehnie şi Tehnologii de industrie alimentară, vol.X, Anul 10, Editura Universităţii din Oradea.
13. Oneţ Cristian, 2012, Igiena mediului, Editura Universităţii din Oradea.
14. WHO, 1993, Guidelines for Drinking Water Quality, Volume 1 Recommendations, Second edition. Geneva, World Health Organisation.
15. World Health Organisation., 1995, Guidelines For Drinking Water Quality, W.H.O. Geneva.
16. The Water Industry Act, 1991, Stationery Office Ltd..
17. The Water Supply (Water Quality) Regulations, 2000, Statutory Instrument 2000 No. 3184, Stationery Office Ltd..
18. The Water Supply (Water Quality) Regulations, 1989, Statutory Instrument 1989 No. 1147, Stationery Office Ltd..
19. United States Environmental Protection Agency (EPA), 2006, Washington, DC. "Water Quality Standards Review and Revision".
20. ***www.mcilvainecompany.com.