MANAGEMENT OF THE WASTEWATER DISCHARGED BY THE MILK AND MEAT PROCESSING FACTORIES

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Abstract

Following the visits to the four milk and meat processing factories were obtained data regarding the wastewater management.

The volume, concentration, and composition of the effluents arising in food industry are dependent on the type of product being processed, the production program, operating methods, design of the processing plant, the degree of water management being applied, and subsequently the amount of water being conserved.

Keywords: wastewater, milk factory, meat factory, food industry.

INTRODUCTION

With the exception of some toxic cleaning products, wastewater from food-processing facilities is organic and can be treated by conventional biological technologies.

Part of the problem with the food-processing industry's use and discharge of large amounts of water is that it is located in rural areas in which the water treatment systems (potable and wastewater systems) are designed to serve small populations.

As a result, one medium-sized plant can have a major effect on local water supply and surface water quality. Large food-processing plants will typically use more than 1,000,000 gallons of potable water per day.

The five-day biochemical oxygen demand (BOD_5) value is used as a gauge to measure the level of treatment needed to discharge a wastewater safely to a receiving water.

The BOD for all food-processing wastewater is relatively high compared to other industries.

A high BOD level indicates that a wastewater contains elevated amounts of dissolved and/or suspended solids, minerals, and organic nutrients containing nitrogen and phosphorus. Each one of these constituents represents a particular contaminant of concern when discharging a wastewater.

The dairy industry is generally considered to be the largest source of food processing wastewater in many countries.

As awareness of the importance of improved standards of wastewater treatment grows, process requirements have become increasingly stringent.

Although the dairy industry is not commonly associated with severe environmental problems, it must continually consider its environmental impact, particularly as dairy pollutants are mainly of organic origin.

Animal slaughter and processing produces very strong organic waste from body fluids, such as blood, and gut contents.

Processing food for sale produces wastes generated from cooking which are often rich in plant organic material and may also contain salt, flavourings, colouring material and acids or alkali.

Very significant quantities of oil or fats may also be present. Wastewater generated from food operations has distinctive characteristics that set it apart from common municipal wastewater managed by public or private wastewater treatment plants throughout the world: it is biodegradable and nontoxic, but that has high concentrations of biochemical oxygen demand (BOD) and suspended solids (SS).

The constituents of food and wastewater are often complex to predict due to the differences in BOD and pH in effluents from vegetable, fruit, milk and meat products and due to the seasonal nature of food processing and postharvesting.

MATERIALS AND METHODS

The research was conducted in 2010, in 4 units of food industry: "Food Unit A", "Food Unit B" which are milk factories and "Food Unit C", "Food Unit D" (meat factories).

"Food Units A", "B" and "C" are placed in Bihor County while Food Unit D is placed in Satu Mare County.

Following the visits to the monitored food units were obtained data regarding the wastewater management.

RESULTS AND DISCUSSION

The wastewater produced by the "Food Unit A" and "Food Unit D" are evacuated in emptying basin.

"The Food Unit B" discharges the wastewater in sewers while the "Food Unit C" evacuates the wastewater in surface waters.

The quality of discharged wastewater indicators are presented in table 1 and 2.

Table 1

Maximum permitted levels of wastewater quality indicators discharged into surface waters according to G.D. 352/2005

Water category	*Quality indicators*	*Allowed values*
Sewage and industrial waters that require treatment	CCO-Cr	125 mg/l
	CBO_5	25 mg/l
	Suspension	35 mg/l
	pH	6,5 – 8,5
	Chlorides	500 mg/l
	Total nitrogen	10 mg/l
	Total phosphorus	1 mg/l
Rainwater	According to H.G. 188/2002 and NTPA- 001/2005	

Table 2

Maximum permitted levels of wastewater quality indicators discharged in sewerage systems according to G.D. 352/2005, NTPA 002/2005

Quality indicators	*Allowed values*
CCO-Cr	500 mg/l
CBO_5	300 mg/l
Suspension	350 mg/l
pH	6,5 – 8,5
Chlorides	400 mg/l
Nitrogen	30 mg/l
Phosphorus	5 mg/l

Depending on need and use of potable water in this research are presented the average quantities of wastewater (m^3/day) discharged by the monitored food units.

Table 3

Average quantities of wastewater (m^3/day) discharged by the monitored food units.

Monitored food units	Average quantities of sewage (m^3/day)	Technological wastewater (m^3/day)	Total discharged wastewater (m^3/day)
Milk factory A	1,38	15,035	16,415
Milk factory B	0,93	28	28,93
Meat processing factory C	6,1	44,8	50,9
Meat processing factory D	0,56	5,08	5,64

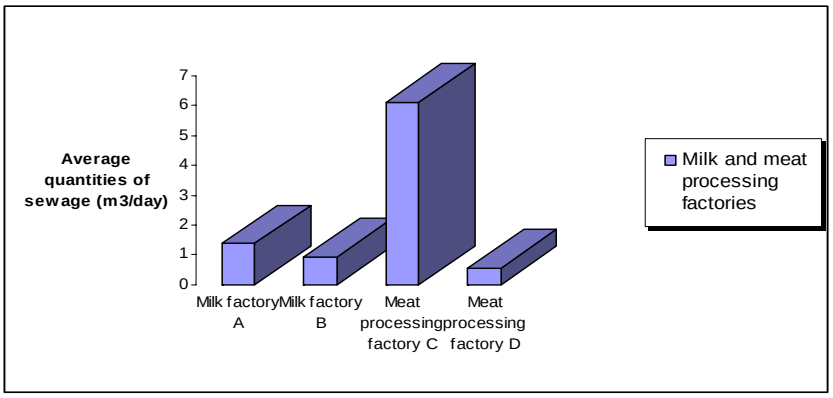

Fig. 1. Average quantities of sewage (m^3/day) discharged by the monitored food units.

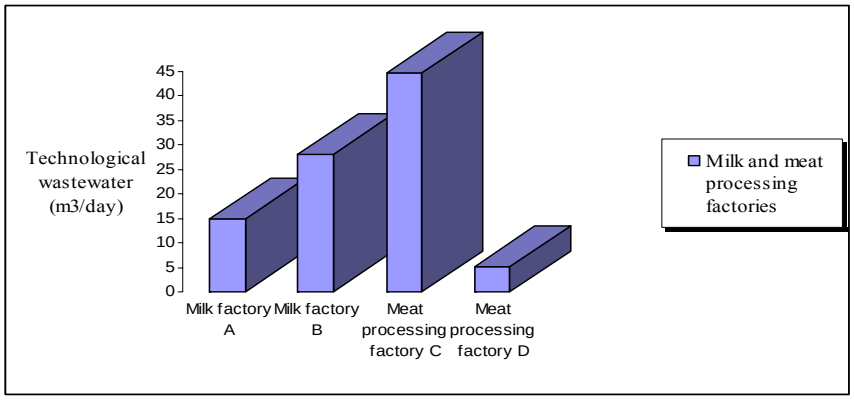

Fig. 2. Average quantities of technological wastewater (m^3/day) discharged by the monitored food units.

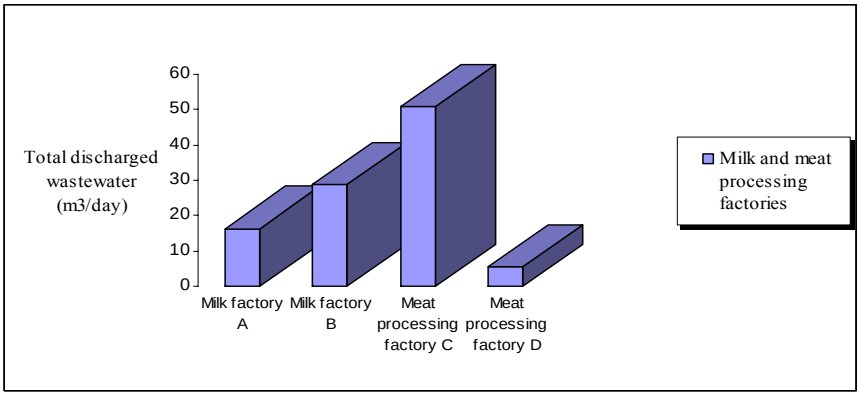

Fig. 3. Evaluation of average quantities of wastewater (m^3/day) discharged by monitored food units

The results presented in this research shows that the highest quantities of discharged wastewater were recorded at “Meat processing factory C” while the lowest consumption was registered at “Meat processing factory D”.

The “Meat processing factory C” is a large factory which produces daily 20 tonnes until the “Meat processing factory D” produces only 2 tonnes per day.

As it can be seen in this research, the meat industry has produced the largest source of food processing wastewater.

CONCLUSIONS

The quantities of discharged wastewater depends by the drinking water consumption, production size, type of product being processed, the production program, operating methods, the degree of water management being applied, and subsequently the amount of water being conserved.

REFERENCES

1. AOAC., 1984, Official Methods of Analysis of the Association of Official Analytical Chemists., Arlington VA: Association of Official Analytical Chemists;
2. APHA., 1992, Standard Methods for the Examination of Water and Wastewater. Washington. DC: American Public Health Association;
3. Banu C., 2002, Food Industry Engineer Book, Tehnical Publishing House, Bucharest;
4. Bara V. Oneț C., 2008, Hygiene Guide in Food Units, University of Oradea Publishing House;
5. Campos, J.R., E. Foresti and R.D.P. Camacho, 1986, Anaerobic treatment in the food processing industry: Two case studies, Water Science Technology 18:87-97;
6. Dague, R.R., R.F. Urell and E.R. Krieger, 1990, Treatment of pork processing wastewater in a covered anaerobic lagoon with gas recovery. In Proceedings of the 44th Industrial Waste Conference, 815-823. Ann Arbor, MI: Ann Arbor Science;
7. G.D. 188/2002 – Annexe 2. Normative regarding conditions of wastewater discharging in municipal sewer and in plant units, NTPA-002/2002;
8. G.D. 188/2002 - Annexe 3. Normative concerning pollutant loading limits for industrial and municipal wastewater at discharging in natural receivers, NTPA-001/2002;
9. Sayed, S.K.I., J. van der Zanden, R. Wijffels and G. Lettinga. 1988. Anaerobic degradation of the various fractions of slaughterhouse wastewater. Biological Wastes 23:117-142;
10. Tritt, W.P. and F. Schuchardt. 1992. Materials flow and possibilities of treating liquid and solid wastes from slaughterhouses in Germany. Bioresource Technology 41:235-245.