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

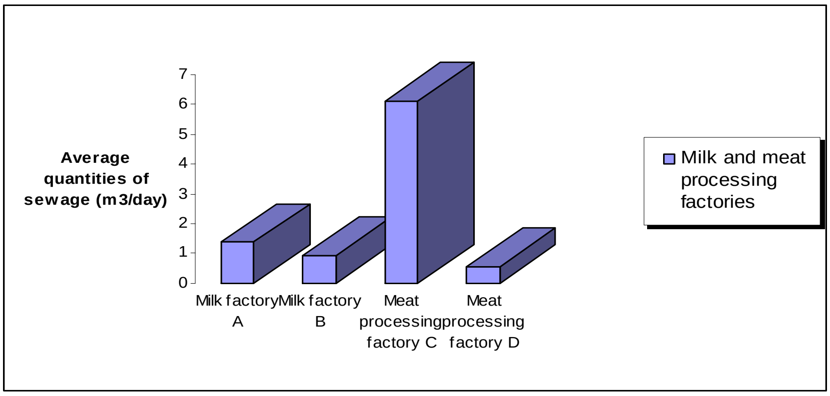

Fig. 1. Average quantities of sewage (m^3/day) discharged by the monitored food units.

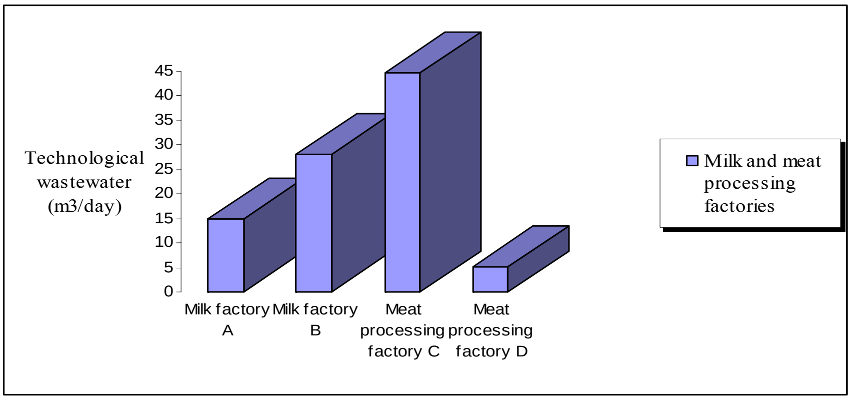

Fig. 2. Average quantities of technological wastewater (m^3/day) discharged by the monitored food units.

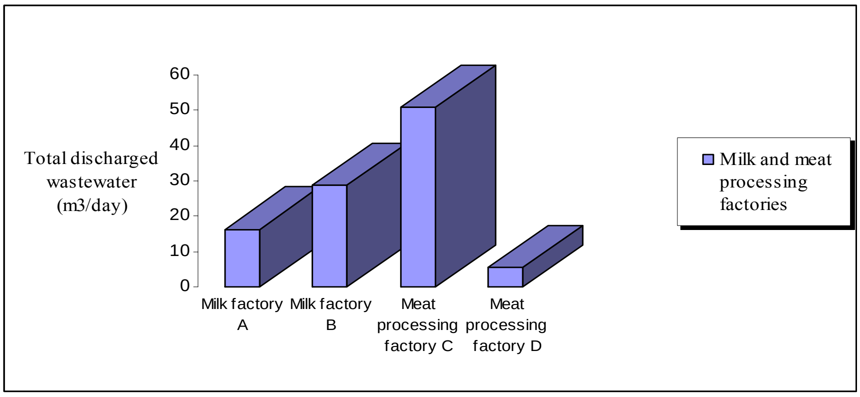

Fig. 3. Evaluation of average quantities of wastewater (m^3/day) discharged by monitored food units

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.

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Â· Envirowise, Cost-effective management of organic waste from the food and drink and hospitality sectors (Guide GG808), Envirowise, 2008, Didcot. Â· Eurostat, Environmental statistics and accounts in Europe â€“ 2010 edition, Eurostat, 2010, Luxembourg. ISBN 978-92-79-15701-1.Â Description The first step in waste prevention and management in accommodation is to generate an inventory of the types and sources of on-site waste generation. PDF | Wastewater is the combination of liquid and water-transported wastes from industrial facilities, along with any groundwater infiltration and | Find, read and cite all the research you need on ResearchGate.Â goal of mankind. In particular, the meat-processing industry uses 24% of the total. freshwater consumed by the food and beverage industry and up to 29% of that. consumed by the agricultural sector worldwide3,4. Slaughterhouses wastewater from. the slaughtering process is considered detrimental worldwide due to its complex. Wastewater purification in the milk processing industry for indirect and direct discharge. Given the quantities of wastewater generated, as well as the fluctuations in load, (especially in relation to the pH value) treatment of the wastewater is necessary prior to either direct or indirect discharge.Â For indirect discharge, the wastewater treatment technology required will depend on the official regulations that apply, (for example local authority by-laws). In rural areas the public sewage plants are often not designed to handle high loads, so that it is necessary to pre-clean the wastewater generated from milk processing in the company's own sewage plant. Taking an international view, milk-processing plants are often not connected to public sewage treatment plants at all. Freezer storage is an excellent method of meat preservation. It is important to wrap frozen meats closely in packaging that limits air contact with the meat in order to prevent moisture loss during storage. The length of time meats are held at frozen storage also determines product quality. Under typical freezer storage of â˜'18 Â°C (0 Â°F) beef can be stored for 6 to 12 months, lamb for 6 to 9 months, pork for 6 months, and sausage products for 2 months. Freezing. The rate of freezing is very important in maintaining meat quality. Rapid freezing is superior; if meats are frozen slowly, large ice Meat processing plants are found to produce large amounts of wastewater due to the slaughtering process and cleaning of their facilities. Further-more, the composition of the wastewater varies according to the type and number of animals slaughtered and the water requirements of the process.Â Up to 24% of the water used in the food and beverage industry is from the meat processing [3]. Slaughterhouses and Meat Processing Plants (MPPs) are part of a large industry worldwide, where the composition of the wastewater depends on the diverse practices in the slaughtering process.Â Direct discharge of untreated slaughterhouse effluents to a water body is not practical due to the high organic load of the SWW. Therefore, appropriated disposal and treatment is required.