WASTEWATER QUALITY MONITORING IN MEAT INDUSTRY

Oneț Cristian*

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

Abstract
The wastewater samples from two meat processing factories was characterised after treatment at the plant before discharging in emptying tank or in surface waters. Samples of wastewater were assessed using their physical and chemical parameters as indices. The monitoring results reveal also information about water usage, wastewater volume, characteristics and the quality of meat industry wastewater.

Key words: water, hygiene, wastewater.

INTRODUCTION

Wastewater derived from meat industry is very harmful to the environment. Effluent discharge from meat processing factories cause the deoxygenation of rivers and the contamination of groundwater. The pollution potential of meat-processing plants has been estimated to be at large scale. Blood, one of the major dissolved pollutants in meat processing wastewater, has a chemical oxygen demand (COD) of 375 000 mg/L (Tritt and Schuchardt 1992). These insoluble and slowly biodegradable SS represented 50% of the pollution charge in screened (1 mm) meat processing wastewater, while another 25% originated from colloidal solids. Meat processing wastewater quality depends on a number of factors, namely:
1. Blood capture: the efficiency in blood retention during animal bleeding is considered to be the most important measure for reducing biological oxygen demand (BOD) (Tritt and Schuchardt 1992);
2. Water usage: water economy usually translates into increased pollutant concentration, although total BOD mass will remain constant.

The objective of this project was thus to characterise wastewater from two meat processing factories. In 2009 and 2010, several meat processing factories were visited. Data on wastewater quality after in-plant treatment are presented.

MATERIAL AND METHODS

Between July 2009 and July 2010 two meat processing factories were visited. The first (Meat processing factory –A) had the largest capacity while second (Meat processing factory –B) had the lowest. The both monitored food units are placed in Bihor County and Satu Mare County. Also, information was collected on plant, water usage and wastewater volume. The wastewater was characterised after treatment at the plant before discharging in emptying tank or in surface waters. All samples were analysed in duplicate for COD, BOD, solid content, pH, chlorides, total nitrogen and phosphorus. Analyses were done according to methods outlined in G. D. 188/2002.

RESULTS AND DISCUSSION

In the following are presented the monitoring results wich reveal information about water usage, wastewater volume, characteristics and the quality of meat industry wastewater.
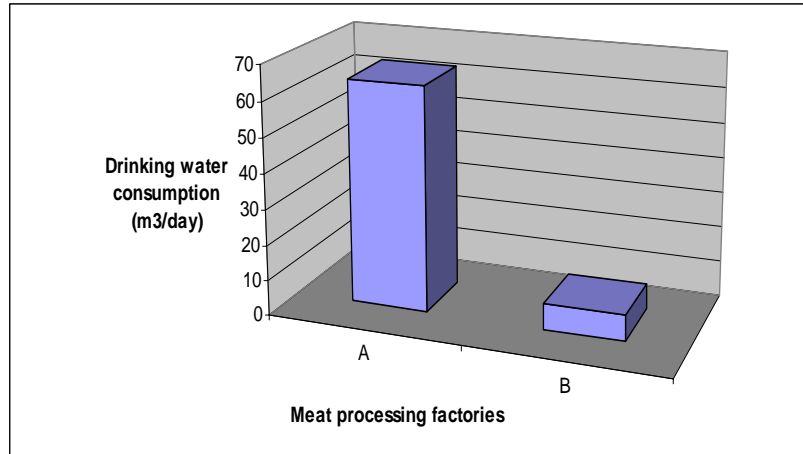

Fig. 1 Drinking water consumption (m^3/day) in monitored meat processing factories
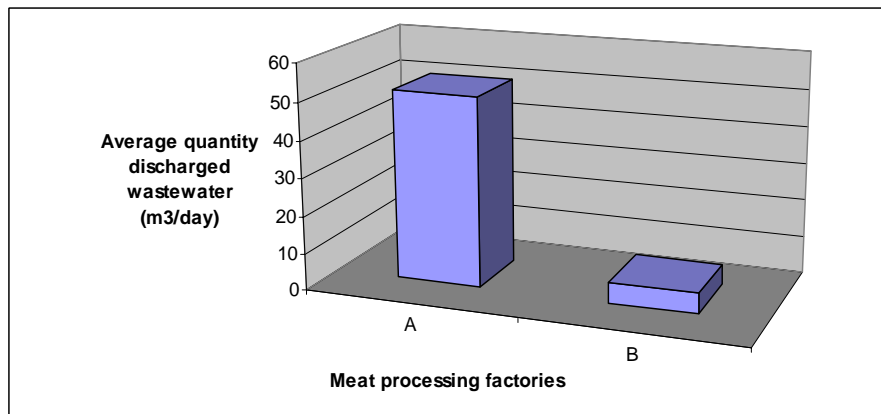

Fig. 2 Evaluation of average quantities of wastewater (m^3/day) discharged by monitored units

In fig.1 are presented potable water consumption of monitored meat processing factories and in fig.2 are evaluated average quantities of wastewater discharged by monitored units.

The meat processing factory A utilised a higher volum of water and also the quantities of wastewater discharged are higher because has a large capacity compared to meat processing factory B.

The meat processing factory A has a meat production of 20 tons per day comparative with 1 ton per day production of meat processing factory B.

Quality of wastewater from meat processing factory A discharged in surface waters

Crt. nr..	Physico-chemical parameters	Unit of Measure	Results of analysis					Allowed values
			I 07.07.′09	II 06.10.′09	III 12.01.′10	I V 06.04.′10	V 06.07.′10	
1	COD	mg/l	122.82	63.0	74.09	83.83	74	125
2	BOD	mg/l	8.88	9.69	4.86	3.70	23.2	25
3	Suspended solids	mg/l	6.60	9.82	4.64	32.06	34	35
4	pH	pH units	6.49	6.41	6.39	7.19	8.3	6.5 – 8.5
5	Chlorides	mg/l	265.66	346.86	338.98	491.45	425.6	500
6	Total nitrogen	mg/l	0.36	1.42	5.33	4.39	8.4	10
7	Phosphorus	mg/l	0.6	0.38	0.67	0.27	0.85	1

Quality of wastewater from meat processing factory B discharged in emptying tank

Crt. nr..	Physico-chemical parameters	Unit of Measure	Results of analysis					Allowed values
			I 07.07.′09	II 06.10.′09	III 12.01.′10	I V 06.04.′10	V 06.07.′10	
1	COD	mg/l	552	530	452	489	486	500
2	BOD	mg/l	371	315	224	217	215	300
3	Suspended solids	mg/l	365	374	328	313	225	350
4	pH	pH units	8.9	8.7	7.5	8.2	7.0	6.5 – 8.5
5	Chlorides	mg/l	400	346	350	230	125	400
6	Total nitrogen	mg/l	6	9	15	26	16	30
7	Phosphorus	mg/l	0.3	4.1	3.4	2.3	3.1	5

In table 1 and 2 are presented the characteristic of wastewater from meat processing factories. Wastewater quality was expressed according to indicators monitored values: COD, BOD, total suspended solids, pH, chlorides, total nitrogen and total phosphorus. The meat processing factory A has own wastewater treatment plant and the wastewater are treated and discharged in surface waters. In this situation, wastewater quality must conform with the normative regarding the quality of wastewater evacuated in surface waters G. D. 188/2002. NTPA-001/2002. As it can be seen in table 1, all the analysed parameters coresponded to water quality standards. The meat processing factory B is a small factory and it doesn′t own a wastewater treatment plant. Wastewater are pre-treated and evacuated in emptying tank. In this conditions wastewater was sampled after the screening or settling of coarser solids. The quality of wastewater discharged in emptying tank must be conform with the normative regarding sewer discharge. The results presented in table 2 reveal that in 2009 the monitored parameters: COD, BOD, suspended solids and pH have concentrations and values to high for sewer discharge but in 2010 all analyzed parameters are within the water quality standard.

CONCLUSIONS

Wastewater from meat processing factory B contained in 2009 high concentrations of degradable organics. Existing wastewater treatment was not sufficient to produce an effluent that complied with municipal treatment plant criteria. 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.

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