POSTER PRESENTATIONS

THE EFFICIENCY OF A SLAUGHTERHOUSE WASTEWATERS TREATMENT PLANT AND THEIR POLLUTANT POTENTIAL

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SUMMARY

The pollutant potential of residual waters from slaughterhouses can be decreased by multiple purification methods. Researches undertaken in a modern chicken slaughterhouse, equipped with a mechanical-biological purification station and with final evacuation in surface waters, showed that it did not function properly. Thus, in spite of the fact that measured parameters reduced with values between 4.27 and 100%, the maximum admitted limits of pH, ammonium and CCO-Cr were exceeded.

Keywords: wastewater, slaughterhouse, efficiency, pollutant potential

INTRODUCTION

Because of their composition (Borda and Drăghici, 2001), residual waters from slaughterhouses have a high pollutant potential. In order to treat these waters and decrease the pollution, many technologies exist, with proper results if they are applied correctly.

Our previous researches showed that the small studied slaughterhouses are not properly equipped for the treatment of wastewaters. As a consequence these waters pollute either the sewage networks (Borda et al., 2002), or the surface water in which they are discharged (Borda et al., 2005).

As a result of Romania's adhesion to the European Community, many slaughterhouses were closed, because they did not respect the veterinary sanitary standards and environmental protection.

The present work aims to establish the efficiency of wastewater treatment plant from a modern poultry slaughterhouse as well as the pollutant potential of wastewaters at the discharge point.

MATERIALS AND METHODS

The research was undertaken in a slaughterhouse with a maximum capacity of 24,000 tones/year, the volume of residual waters being of 350–400 m^3/day. The slaughterhouse is provided with a modern mechanical-biological treatment plant, the circuit of the raw wastewater is as follows:

plumes skimmer – primary settling tank – releasing sieve – homogenisation tank – flocculator – polymers added tank – floating unit – aeration tank**.** After treating the water being evacuated in surface water (spring). Samples were collected in two points: at the entrance of water in the treatment plant (raw wastewater) and at the entrance of water in the spring (treated wastewater).

Four determinations in one year were made, and the following parameters were analysed:

- sediment – with Imhoff cones;
- conductivity – with electronic conductivity-meter (Conmet 1, Hanna Instr.);
- pH – with electronic pH-meter (Checker 1, Hanna Instr.);
- dry matter – at 105 ^{o}C, after centrifugation;
- ammonium – by distilation;
- chemical oxygen demand – potassium bicromate method;
- biochemical oxygen demand – Winkler method;
- total number of aerobic mesophilic germs (TNAMG) – with nutrient agar;
- most probable number of total coliforms and fecal coliforms – the multiple test tubes method, with lactose broth for the presumptive test, and with Levine medium for the confirmation of total coliforms and brilliant bile broth for the confirmation of fecal coliforms.

RESULTS AND DISCUSSION

The results of the analyses being presented in the following tables:

Table 1. Physical and chemical parameters

Parameter	**Sample**	**1.**	**2.**	**3.**	**4.**
Sediment	RW	8.2	5.5	2	0.5
(mL/L)	TW	0	0	0	0
	D%	**–100**	**–100**	**–100**	**–100**
Conductivity	RW	1346	404	306	1169
(µS/cm)	TW	1038	1239	1047	947
	D%	**–22.88**	**+206.68**	**+242.15**	**–18.99**
pH	RW	5.80	5.52	6.31	6.17
	TW	4.94	4.43	6.04	5.60
	D%	**–14.82**	**–19.74**	**–4.27**	**–9.23**
Dry matter (mg/L)	RW	810.41	927.08	625	1666.66
	TW	525	647.05	520	208.33
	D%	**–35.21**	**–30.20**	**–16.8**	**–87.50**
Ammonium (mg/L)	RW	95.78	14.00	21.61	48.24
	TW	18.15	12.20	14.40	0.90
	D%	**–81.05**	**–12.85**	**–33.36**	**–98.13**
COD-Cr (mgO_2/L)	RW	1120.00	1323	630.00	584.00
	TW	99.00	45	138.00	79.00
	D%	**–91.16**	**–96.59**	**–78.09**	**–86.47**
BOD_5	RW	225.00	322.00	94.50	118.50
(mgO_2/L)	TW	12.10	8.45	14.90	5.50
	D%	**–94.62**	**–97.37**	**–84.23**	**–95.35**

RW-raw wastewater; TW-treated wastewater; D% – percentage differences between raw and treated wastewater.

Table 2. Bacteriological parameters

Parameter	Sample	1.	2.	3.	4.
TNAMG (cfu/mL)	RW	74,000	105,000	1,810,000	225,500
	TW	6775	1103	5800	76,000
	D%	**–90.84**	**–98.94**	**–99.67**	**–66.29**
Total coliforms (MPN/100 mL)	RW	3,300,000	33,000	2,600,000	17,200,000
	TW	16,090	3300	7900	278,000
	D%	**–99.51**	**–90**	**–99.69**	**–98.38**
Faecal coliforms (MPN/100mL)	RW	3,300,000	33,000	1,700,000	17,200,000
	TW	16,090	3300	4900	278,000
	D%	**–99.51**	**–90**	**–99.71**	**–98.38**

After the water crossed the treatment plant, the values of determined parameter reduced, in almost all cases:

- sediment totally reduces in all determinations;
- conductivity reduces its values at the first and last determination, in the other 2 cases increasing with 200%;
- pH reduces with percentages between 4.27 and 19.74;
- dry matter reduces in the 4 determinations with percentages between 16.8 and 87.50;
- COD-Cr reduces with values between 78.09 and 96.59%;
- BOD_5 reduces with percentages between 84.23 and 97.37;
- the most dramatic decrease is that of bacteriological parameters between 90 and 99.71%.

In spite of this fact, the admitted limits for used water evacuated in natural receptors (NTPA-001, 2002) exceeded for the following parameters:

- pH, in all 4 determinations, with values between 0.47 and 2.07 pH units (figure 1.);
- ammonium, in the first three determinations, with values between 9.2 and 15.15 mg/L (figure 2.);
- COD-Cr, in determination no. 3, with 13 mg/L (figure 3.).

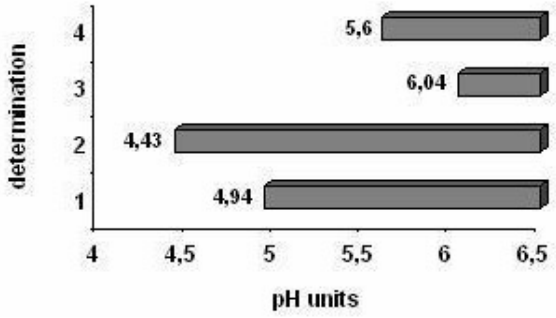

Figure 1. pH-exceeded of lover admissible limit

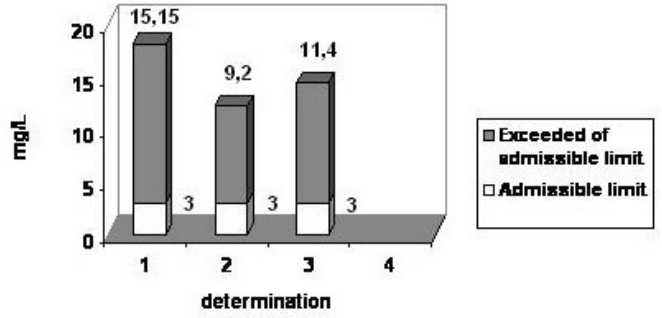

Figure 2. Ammonium-exceeded of admissible limit

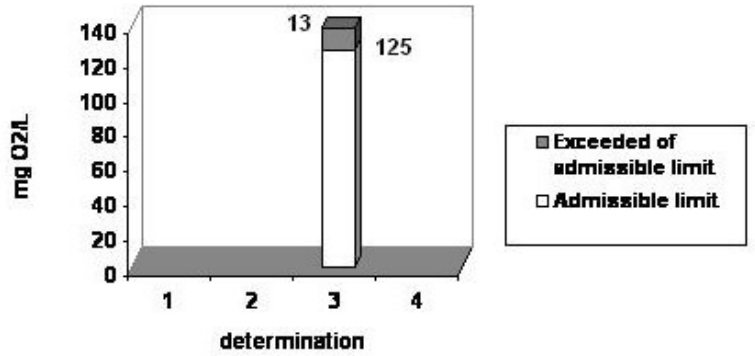

Figure 3. CCO-Cr-exceeded of admissible limit

CONCLUSIONS

After analysing all these results, the conclusions are:

- the treatment plant from this slaughterhouse, even if it is modern, is not very efficient and produce the pollution of surface waters in which used water is evacuated; this fact is due, in my opinion, to a break in the functioning of the slaughterhouse, produced shortly after its first use;
- urgent optimization measures are needed, in order to stop the pollution.

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