

SOME APPROACHES TO SOLVING THE PROBLEMS OF ECOLOGIZATION OF HIDE CONSERVATION PROCESSES

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Analysis of nature and levels of potential effects of slaughter animals hide conservation processes on the environment shows that the main factors are discharges, containing significant amounts of chemical substances used in technological processes that had not taken part in reactions.

At the present time sodium chloride and fluosilicate, paradichlorobenzene, coke industry naphtalene, soda ash, potassium alum, ammonium chloride, etc., are used for hide conservation. They are mainly related to the 2nd-3rd class of danger.

The levels of these substances in effluents are strictly limited and controlled by environment protection agencies.

According to available data about 30 % of the mass of used curing ingredients are bound by hides during conservation and about 37 % of the weight of curing mixture (according to expert estimates) are retained by the materials being conserved, and the rest is washed out into canalization what creates practically unsolvable problem of effluents cleaning from the dissolved admixtures to meet the established maximum allowable concentrations.

Table 1 shows a material balance of a number of processes of hides conservation. From its analysis it follows that with dry curing of hides the carrying away of a curing mixture by the waste water is calculated as 328 kg, among it sodium chloride and sodium fluosilicate – 317 and about 11 kg, respectively, and with brine conservation, (other things being equal to the first version), - 606 and 6,1 kg, respectively.

Comparison of the results shows that with brine conservation the losses of the curing mixture are much higher than those with dry curing.

It is unlikely that lower losses of sodium fluosilicate with brine conservation will be of practical importance, as its use is obligatory with brine conservation but not with dry curing. Therefore, the main cause of the increased salt content of the effluents of a meat-processing plant in traditional solutions is the area of hides conservation. But, nowadays, for the cleaning of effluents, meat industries both in this country and abroad don't use methods that remove the indicated admixtures, due to complications and high costs of the processes.

AIM OF INVESTIGATIONS

Introduction of modifications into technological process of hides conservation with the aim of reduction of losses and carrying away of curing ingredients by waste waters.

For this purpose, for the first time, the ecological characteristics of the processes of hides conservation were studied, including dry curing in a spread condition and in the drum of type YA8-FKM, as well as brine conservation.

OBJECT AND METHODS OF INVESTIGATIONS

On the basis of the working meat-processing plant, under the conditions of pilot production the consumption of water for each operation was determined, as well as the composition of effluents and their amount.

Based on the data obtained, the losses of curing mixture for different methods of technological treatment of hides were calculated.

To characterize the losses of curing mixture with effluents, the values of «calcinated residue» and «chloride content» were adopted, with the deduction of their amount from the drinking water used in the production.

RESULTS AND DISCUSSION

Analysis of the data obtained (Tables 1 and 2) suggests that the maximum amount of effluents is with brine conservation of hides – 1,3 m³/t of raw materials, when the brines are used three times, and 3,9 m³/t – for the conditions of disinfection; the minimum amount – is about 300 l/t that is associated with the separation of the tissue liquid, is characteristic of a dry curing of the spread hides; when conservation by dry curing in the drum is used, the amount of effluents is about 700 l/t, 400 l of this amount is the water used for cooling of the drum.

The losses of the curing mixture during disinfection by brine are about a factor of one higher than those with similar treatment of the hides by a dry method. Brine preservation is also followed by significant losses of a curing mixture together with the waste solutions – 308 kg/t of hides versus 100 kg/t with dry curing in the drum.

The experimental investigations unambiguously confirmed the calculated level of carrying away of the curing mixture when treating the hides of the slaughter animals.

To develop the grounded decisions on ecologization a complex evaluation is necessary, predicting a change in the production efficiency as a system in the implementation of the suggested actions reducing the effluent contamination. Such analytical approach was tested for hide conservation processes of meat plants.

CONCLUSION

Analysis and review of the results of the investigations strongly dictate the necessity of local decontamination of concentrated discharges of the area of hide conservation. The calculations show that the operating meat plant with the capacity of 30 t of meat per shift using dry curing technology will have 2,0 m³ of effluents for local decontamination. Analysis of the version of treatment of such



volumes of concentrated effluents by evaporation using a vacuum evaporating plant showed its profitability. Moreover, the found ecological characteristics of brine conservation of hides indicate their low efficiency as compared to dry curing.

Local decontamination of concentrated effluents will decrease the effluents load of the whole plant on a number of characteristics being controlled, among them chlorides and salt content – to the level of maximum allowable concentrations and to significant degree will simplify the problem of local cleaning the effluents of meat plants.

Table 1

Material balance of hides conservation processes

Kind of treatment	Yield of warm hides (t) per shift at a meat plant with capacity 30 t of meat per shift	Amount, kg		Amount (kg)			
		common salt	fluosilicate	remaining in tissues of hides and on their surfaces		coming to the production effluents during curing and sanitizing of shops	
				sodium chloride	fluosilicate	sodium chloride	fluosilicate
Dry curing of hides:							
cattle – spread	1,50	638	16,8	465	9,3	173	7,5
pigs – in the drum YA8-FKM	1,25	438	12,5	294	9,4	144	3,1
Total:	2,75	1076	29,3	759	18,7	317	10,6
Brine conservation of cattle hides	1,50	848	7,8	386	4,8	462	3,0
Dry curing of pigs hides in the drum YA8-FKM	1,25	438	12,5	294	9,4	144	3,1
Total:	2,75	1286	20,3	680	14,2	606	6,1

Table 2. Characteristic of effluents from hides conservation processes

Index	Effluents from hides conservation			Effluents from hides disinfection			Effluents from sanitizing of shops
	cattle		pigs, dry curing in the drum	cattle		pigs, dry curing in the drum	
	brine conservation	dry curing, spread		brine conservation	dry curing, spread		
<u>Characteristic of effluents</u>							
Total content of admixtures, g/l	266,0	174,0	382,7	295,1	349,0	367,5	68,48
Amount of substances, g/l							
suspended	47,1	17,0	83,2	6,2	16,1	36,6	12,0
dissolved	218,9	157,2	299,5	288,9	332,9	330,9	56,48
Calcined residue, g/l	168,2	140,0	278,6	257,3	309,5	311,6	52,58
Content:							
fat, mg/l	38,1	79,4	1625,0	161,1	191,2	582,1	4543,8
chloride, g/l	136,3	97,2	196,3	184,9	183,9	178,2	41,9
COD, mgO ₂ /l	8032,0	11112,0	29175,0	30315,0	40386,0	47607,0	3819,0
<u>Characteristic of specific amount of effluents and losses of curing ingredients</u>							
Amount of effluents, l/t	1300	284	700*	3900	284	700*	500
Calcined residue, g/l	218,4	39,8	83,6	1003,6	87,9	93,5	26,3
Amount of chloride, kg/t	177,1	27,6	58,9	721,1	52,2	53,2	20,9

* Including 400 l cooling water