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THE BAROMEMBRANE TECHNOLOGY IN THE COMPLEX REPROCESSING OF WASTES OF MEAT PROCESSING PLANTS.

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INTRODUCTION.

One of the most alarming problems of cattle-breeding industry is a dificit of fodder protein & unbalance in existing protein ration /I/.
The meat industry which is the main supplier of protein for food & fodder and in particular for the account of sewage has good potentialities in the solution of this problem. The structure of natural biopolymers which contain in sewage is a highly valued source of nutrient substances with high content of lipids, proteins, cellulose, minerals and presupposes real perspectives of theirs wide range utilization with receiving biologically full valued fodders for agricultural animals & poultry.
At the present time a tendency which is quite progressive from the point of view of technological and economical approaches is outlined in the respect to reprocessing concentrated wastes by the way of introduction of technological processes with little wastes or with no wastes on the plants of the industry which is based on the development & practical installation of modern systems of local cleaning of technological sewage.
It is well-known that traditional technological operations of clearing and utilization of valuable admixtures on the enterprises of the industry have a very little effect and allow only to reduce the concentration of admixtures and can not reach the level of PDK (the allowed level of concentration) /2/.
The analysis of scientific and technological literature and the positive effect of the use in some of processing industries give an opportunity to estimate the perspectives of inclusion of baromembrane processes as given good results in separation, cleaning & utilization of valuable components, increasing the water recycling rate and decreasing its pollution /3/.

The aim.

The aim of the present paper is to find the effective ways of sewage clearing of meat processing plants situated in Central Chernozem zone of Russia on the basis of baromembrane methods of separation with subsequent processing of utilized valuable products for the purpose of producing fodder concentrates.

The methods.

Experimental investigations of meat processing plants sewage clearing were carried out at a laboratory pilot ultrafication unit. As a filtration material the half-permeable membranes on the basis of resistent polyumers, polysulphons, aromatic polyamides, polysulphonamide under TU 6-05-2044-87 which were produced by the scientific industrial association (SIA) "Polymersynthesis", town of Vladimir, SIA "Plastics", town of Moscow, SIA "Tasma", town of Kazan.
The control for the basic characteristics and evaluation of the effect of separation were carried out with measurings in the origin enviroment and in flows of baromembrane separation in accordance with the methods /4/. The examination of the chemical structure, sanitary and biological characteristics and food value of fodders were carried out in accordance with methods /5,6/. The fatty acids structure was determined on liquid chromotograph "Milichrom-4". The data was processed by computer with the use of the method of internal normalization. Amino-acid structure was determined on aminoanalyser AAA-881 in accordance with recommendations to the unit.

Results and descussions.

The meat processing plants sewage consists of flows formed at different production stages. The composition of the latter is characterized by substances with multicomponent structure which form colloid solutions with different aggregative and sedimentative resistance.
The object of the investigation was selected directly from the last pocket of the fat-catcher, from which the sewage is directed to the canalization system.
The sewage analysis of meat processing plants of Central Chernozem zone of Russia (with a capacity from 50 to 100 tons per shift) after statistic analysis of data received allows to aduce the average data obtained in experiments: temperature: from 18 to 26 degrees C; odour up to 5 bands; colour: reddish-brown; fraction of total mass of suspended particles: 2000 mg/cubic dm; fatr content: 1000-3000 mg/cubic dm; total hardness: 10 mg⋆equi/cubic dm; carbonate hardness: 10 mg⋆equi/cubic dm; total alkali: 10 mg⋆equi/cubic dm; salt content: 1500 mg/cubic dm; Ca2+: 75 mg/cubic dm; Mg2+: 50 mg/cubic dm; Cl-: 900 mg/cubic dm; So : 500 mg/cubic dm; free Co2: 100mg/cubic dm; total Fe: 20mg/cubic dm; total N: 150 mg/cubic dm; phosphorus (in terms of P205) : 60 mg/cubic dml; NH : 30 mg/cubic dm; No3: 0,02 mg/cubic dm; No2: 0,05 mg cubic dm; active chlorine - 0; BPK: 800 mgO2/; HPK - 200 mgO2/cubic dm.
By the way of experimental investigation we established that in the process of ultrafiltration cleaning the pollution decreases to 2 or 3 levels, the quality of water improves from the point of view of sanitaric and hygienic characteristics.
The permeate formed is a liquid of light-rose colour with specific smell of blood and of stable physical and chemical composition, practically freed from any microbes, without any content of toxines as a result of high quality of selection of half-permeable membranes in respect to bacterial and yeast microflora.

Analysis of the whole chemical composition of ultrafiltration concentrate shows that this system is rich in proteins, lipids, minerals and is a complex binary mixture.
The fraction of total mass of protein in the concentrate allows to have an optimal level of animal protein in mixed feed. The protein fraction of the concentrate conditioned by its aminic acid composition is biologically full valuable. In calculation to dry substance (mg/gm): lysine - 16,86; histidine - 1,96; arginine - 20,99; threonine - 14; serine - 12,05; proline - 13,21; glycine - 18,71; alanine - 23,96; valine - 22,94; methyonine - 10,04; leucine - 18,94; isoleucine - 5,38; tyrosine - 8,86; phenylalanine - 11,10; asparagic acid - 32,37; glutaminic acid - 36,55.
The mineral composition of ultrafiltration protein and fat concentrate (UPFC) shows that it was formed with mineral components of water and mineral components of the wastes of meat. It is represented by (mkg %): Si - 6,0; He - 91,0; Mp - 9,5; Na+ - 0,8; K+ - 0,44; For bloody meal, respectfully, (mkg %): Si - 7,2; He - 102; Mp - 97; Na+ - 0,85; K+-0,18.
UPFC lipid fraction was investigated for physical and chemical characteristics (peroxide value, iodine number, saponification number, Reichert-Meissel number, Polenske number, melting & thickening points) condiotioned by fatty acids' composition.
The analysis of UPFC fatty acid composition carried out with use of chromotographic method and in comparison with beef and pig's acids proves that there are mainly the following acids: unmaximum fatty acids with double link C18:1 including (in %) olienic - 38,37; maximum fatty acids: (in %) - C12:0 lauric - 3,8; C14:0 - myristic - 2,3; C16:0 - palmitic - 26,5; C18:0 - 26,5; C18:0 - stearic -7,5; C20:0 - arachidonic - 1,4. Unmaximum fatty acids with two double links (in %) - C18:0 - linolic - 20,2. It was determined that UPFC fatty acid composition is identical to fatty acid composition of pig's fat.

Conclusion:
The use of baromembrane methods of separation allows to solve a complex task of cleaning and rational usage of products of separation. The mass content and the mass relation of food components in extracted concentrate, theirs fractional composition prove the utility of producing protein food products with high feed and biological value.

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