INTEGRAL PROCESSING OF MEAT RAW MATERIAL – BASIS FOR INTENSIFICATION, RESOURCE – AND POWER-SAVING OF PRODUCTION

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Background

Growth of population, restricted power and water resources, higher than usual requirements to environmental protection make development and utilization of progressive technologies in the sphere of cattle processing and meat production manufacture an actual problem of the current century. During the last decades of the past century a number of scientific and design works resulting in creation of principally new technological processes and equipment were carried out. Their utilization allows to give up traditional methods of cattle slaughter, meat cutting and secondary raw material processing, as well as to obtain stable in storage high-quality biologically valuable general- and dietetic-purpose foods. However the progress achieved didn't fully touch upon all the sharp problems risen in meat raw material processing and requiring immediate solution.

Objectives

Results of investigations in creation of a resource- and power-saving technologies ensuring intensification of the production process due to integral processing of cattle slaughter products in one apparatus are the purpose of this paper.

Methods

Fat tissue of cattle and pigs (raw fat), blood and animal inedible wastes served the object of investigations. Each of the above kinds of raw materials was processed according to two schemes: by the traditional method and according to the developed technology. Rendered edible and inedible fat, dried blood and meat-bone flour were the final products. In the course of experiments the amount of initial raw material and final products, water consumption, heat-and-power consumption, chemical and microbiological indices of final products, content of fat substances in production drainages were determined. The above indices were determined by the generally accepted methods.

Processing by the traditional methods was carried out as follows: raw fat – on the fat rendering line RZ-FVT-1 (Russia); blood – in the centrifugal machine AVZh-245K (Russia) and a drying installation (firm "Nema", Germany); inedible wastes – in the installation for dehydration of flesh inedible raw material and in the vacuum boiler KVM-4.6M (Russia).

Raw material processing according to the developed technology was carried out in the designed apparatus (rice), blood drying and fat and crisp fat refining, utilizing facilities analogous to those used by traditional methods.

Results and Discussion

The essence of the developed technology is in realization of several technological operations during processing in one apparatus. For example, during raw fat processing preliminarily ground raw material enters the apparatus rotor where it is crushed by the movable knife. Then under the action of centrifugal force particles are pressed down and forced through perforation holes in the rotor inner surface, trimmed by knives, again forced through perforation holes of the rotor outer wall and trimmed by the immovable knife. At the same time particles are affected by steam during grinding. Finely ground and heated particles of raw materials get into the smelting chamber, where in the process of flow turbulization final fat rendering and partial dehydration of the raw material protein component take place. The suspension obtained is removed from the apparatus under the rotor pressure and is transported along the pipe (possibly, at a distance of up to 100 m) for further treatment. The total duration of the treatment process in the apparatus, including grinding, heating, fat rendering, partial dehydration, and inactivation of vegetation microflora, doesn't exceed 15 s. During blood processing, in order to obtain a dry soluble product steam is not delivered to the apparatus.

Comparable results obtained at the raw material processing according to the traditional and developed technologies are given in the table below.

Indices	Raw fat		Blood		Inedible wastes	
Technology	Traditional	Developed	Traditional	Developed	Traditional	Developed
Process duration, min-s	0–20	0–15	15–00	0–15	8–00	0–15
Final product output (fat extraction degree), raw material mass %	98.0	99.0	15.0	18.0	22.0-28.0	25.0-30.0
Final product characteristics						
Fat:						
acid number, mg/KON	1.0-2.5	1.0-2.5	-	-	8.0-12.0	6.0-10.0
peroxide number, iodine %	0-00.1	0-0.01	-	-	0.02-0.03	0.01-0.03
Dry blood:						
content of soluble protein substances, protein %	-	-	83.0	90.0	-	-
Flour:						
Content, %:						
moisture	-	-	-	-	7.0-9.0	7.0-9.0
fat	-	-	-	-	13.0-18.0	6.4-9.0
protein	-	-	-	-	42.0-50.0	51.0-55.0
Thermal and power consumption per 1 t of raw material:						
electric power, kW·h	13.0	10.0			95.0	90.0
steam, kg	150.0	130.0			700.0	200.0
water, m^3	0.2	-			0.2	-
Fat content in production drains, mg/dm^3	300.0	10.0	-	-	1000.0	1.0

Conclusions

Technology providing for chopping, heating, fat extraction, partial dehydration and inactivation of vegetative microflora was developed and an apparatus for integral processing of meat raw material was manufactured. Application of the above technology ensures considerable intensification of the process, increase in the output and quality of final products, minimization of losses and production drains contamination, exclusion of water utilization, heat- and power-consumption saving, as compared to traditional technologies. Results of continuous industrial approbation of the above technology for raw fat, blood and inedible wastes processing confirmed its high efficiency and outlook of wide use at cattle slaughter enterprises.

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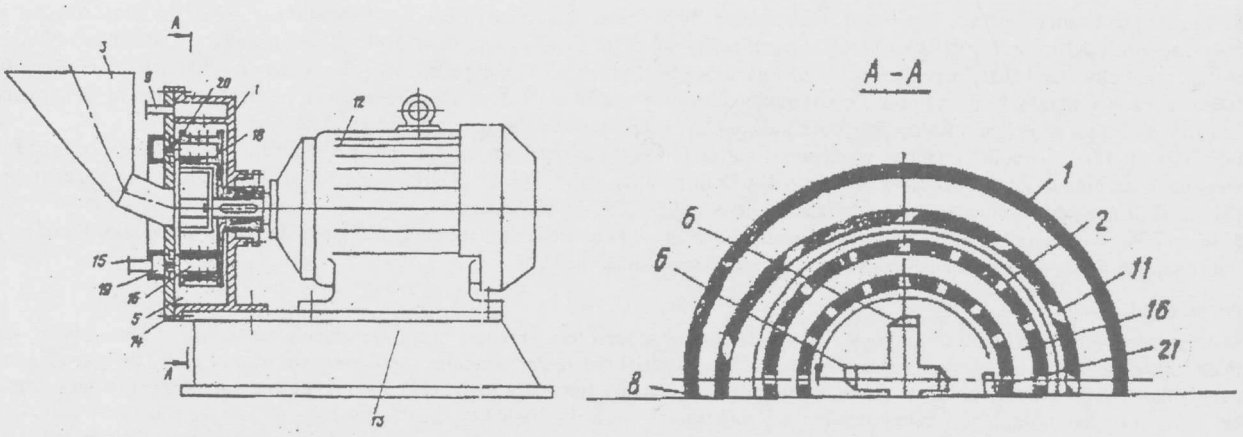

Apparatus for meat raw material integral processing:
1 – body; 2 – rotor; 3 - bin; 4 – steam chamber; 5,16 – smelting chamber; 6 – movable knife; 7,21 – unmovable knife; 8 – blade; 9, 15 – steam supply pipe; 10 – suspension removal pipe; 11,20 – steam holes; 12 – electric motor; 13 – frame; 14 – cover; 17 – inner rotor perforated wall; 18 – rotor base; 19 – steam collector