

Improvement of Mixing Equipment in the Meat Industry

G'iyosiddin Rajabov¹, Farhod Rahimov²

Annotation: This article is devoted to the meat industry, improving the equipment used, including mixing equipment used in the manufacture of smoked products. Typically, the exact model of mixer is selected depending on the intended use. In most mixing equipment, the raw meat is overheated, which leads to denaturation of the proteins in the meat and loss of juiciness of the final product. This has a negative effect on its taste. In addition, this situation limits the possibility of using these mixers to mix other vegetable products. The use of improved mixing equipment, the essence of which is described below, improves the mixing quality of minced meat, as well as increases the overall productivity of the production process. Modernized mixers also have a positive impact on the development of the food business.

Key words: meat industry, smoked products, mixing equipment, technological process, juice production, productivity.

Introduction. Meat business is the most important, rapidly developing and demanding economic sector of food processing in our country.

According to the State Statistics Committee of the Republic of Uzbekistan, in 2016-2020, the production of beef / mutton increased, ie in 2016, respectively, 1634.8 / 365.8; 1721.4 / 385.2 in 2017; 1829.6 / 409.4 in 2018; 1857.3 / 416.3 in 2019; In 2020, it amounted to 1909.3 / 389.6 thousand tons.³ A number of positive changes have been achieved due to the attention of our government to this area and the systematic implementation of a number of tasks set by experts in the field⁴.

The position and importance of the meat industry within the framework of national economy can be defined as follows⁵:

- It is directly linked with the primary agricultural production so that it represents the second level of the vertical line, which converts the raw material of animal origin to food.
- It preserves and processes animals to meat and meat products so that it creates preconditions for the nourishment of people.
- It processes animal carcasses and thus increases the value of final produce.

Tools, overalls, and other protective working equipment are required for workers working in slaughterhouses, meat processing plants, and other meat industry activities.

These aids also serve to prevent meat and meat products from bacterial infection. This category of working aids and means is quite broad and includes everything that employees utilize in their specific working operations and settings, such as knives, hangers and hooks for hanging meat, sharpening steel, meat choppers, meat saws, price label holders, and so on. This category also includes all forms of machinery, particularly those portions of these devices that come into touch with the meat and various containers, dishes, roast plates, utensils, and other assistance.

At meat processing enterprises, after grinding raw materials, it is mixed with the ingredients of recipes for obtaining homogeneous systems. The need for this operation may arise when mixing various components; for kneading raw materials to the desired consistency; in the process of preparing emulsions and solutions; to ensure a homogeneous state of products during certain time; in case when it is necessary to intensify heat and mass transfer processes⁶.

The choice of mixing method and equipment for performing this operation is determined by the purpose of mixing and the state of aggregation of the media being processed. The most common ways of mixing - using agitators of various designs (mechanical), compressed air, steam or inert gas (pneumatic), with the help of pumps and nozzles (circulation), continuous mixing due to intensive interaction in the flow of two or more dissimilar liquids (flow)⁷.

¹ Master of Tashkent Institute of Chemical Technology, "Machinery and Aggregates of Food Industry - Department of Mechanics"

² DSc.Professor

³ Data of the State Statistics Committee of the Republic of Uzbekistan (2016-2020).

⁴ Ғ.Ражабов, Ф.Рахимов. Ғўшт маҳсулотларини қайта ишлашнинг айрим жиҳатлари. "Янги Ўзбекистон илм-фанининг замонавий тараққиёт тенденциялари" мавзусидаги илмий-амалий онлайн конференция мақолалар тўплами. 21 апрел, 2022 йил. 66-74-бетлар

⁵ Krčová K. (2000). Postavení masného průmyslu v potravinové vertikále. [Diplomová práce], MZLU, Brno.

⁶ Ивашов В.И. Технологическое оборудование предприятий мясной промышленности: учеб. – СПб.: ГИОРД, 2010. – 736 с.

⁷ Ковалевский В.И. Проектирование технологического оборудования и линий: Учебник для вузов. – СПб.: Гиорд, 2007. - 320 с.

In the meat industry, mechanical mixing used as main or supporting processes. Mixing is the main process in the production of sausages, minced canned food and semi-finished products; in the production of salted and smoked meat products, edible and technical fats, glue, gelatin, organ preparations, blood processing - this process plays the role of a companion⁸.

The kneading device protrudes as a working element of mixers. The design features of such elements are due to the specifics of the resulting product and raw material characteristics. Vertical mixers are used in vertical tanks. They have the form of rotating mixing shafts, which are distinguished by the most diverse blades in their shape and location.

The required technological effect of the operation of mixing meat raw materials, first of all, depends on the design features and type of meat mixers. Depending on the location of workers organs in the reservoir, they are divided into vertical and horizontal.

Meat mixers can be with open and sealed tanks. Depending on the method of unloading, the meat mixers are divided into machines with rotary, tilting and fixed tanks.

In modern meat processing plants in the workshops for the production of meat products for mixing ingredients, bladed mince mixers are often used, consisting of a tank - a bowl, where the operation takes place mixing, the working body - a mixing device, as well as a drive that provides rotation of the working body.

Mixed product viscosity controlled by viscosity sensors located on the kneading body. The sensors, in turn, give an impulse to the on-board computer, which processes their results, and on the basis of well-developed, embedded programs and algorithms gives a signal to the actuator chain - an electro-hydraulic distributor and a hydraulic cylinder on the CVT kneading body drive unit. Speed drive pulley is increased or decreases, depending on the indication viscosity sensors.

The viscosity sensor is designed for enabling selective or continuous measurements of viscosity and temperature. The sensor operates using semiconductor technology and has no moving parts. It is not affected by vibrations or fluid velocity, does not require calibration at the installation site. Since it has no moving parts and is sealed, it can be completely submerged in any liquid.

The principle of operation of the V-belt variator with remote control is based on a synchronous change in the working diameters of the driving and driven pulleys during their rotation using hydraulic cylinder.

The movable disks are mounted on opposite sides so that when changing from position, the plane of belt movement remains perpendicular to the axes of rotation of the pulleys.

The proposed variator assembly consists of two axles and located on them paired sliding cone pulleys. On the axis of the driven pulley is located the actuator - hydraulic cylinder, and the main elements of the variator are driving and driven pulleys, as well as an endless V-belt. Each of the pulleys consists of a pair of sliding cones. When the driven pair is pushed apart hydraulic cylinder, the other moves. In this case, the belt moves in cones in such a way that the working radius of one pair decreases, and the other increases. Due to this, the gear ratio of the variator changes and the speed is controlled at a constant speed of the drive pulley.

CONCLUSION

Based on the topic of this paper, we can declare that the categorization of protective instruments and objects used in the meat industry has not been elaborated even if this is a problem on an operational aspect. The assortment of objects sold for meat business is quite wide because each object carries out unsubstitutable role in the meatpacking and pork butcher's business. The assortment of butcher's knives is really broad. This is a presumption for fast, superior and also safe work. The proposed modernization of the mixer can be easily implemented in the food industry.

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