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TRENDS IN THE DEVELOPMENT OF EQUIPMENT FOR FEEDING CATTLE

Boltianskyi O., Ph.D. Eng.,
Boltianska N., Ph.D. Eng.
Dmytro Motornyi Tavria state agrotechnological university, Melitopol, Ukraine

Technical re-equipment of livestock based on the use of highly efficient sets of machines is one of the important and necessary factors for the revival and development of animal husbandry in the future. Under the influence of new technology is improving the organizational and technological basis of production (increasing concentration of production, making fundamentally new changes in the methods of keeping and feeding animals), technology of preparation of feed for feeding: grinding, mixing, enriching and balancing rations, providing habitat for animals in accordance with their physiological needs, which leads to improved and increased use of productive (genetic) potential of animals, increased economic performance (productivity, reduced resource costs for products, animal care, processes), improves product quality and sales price, losses and irrational use of raw materials and materials are reduced. In addition to the noted extremely large positive impact of technology in agriculture and animal husbandry on the social factors of production: improving working conditions, increasing the level of education and training [1-3].

The dairy industry is one of the traditional branches of agricultural production in Ukraine, and the results of its operation determine the development of many branches of the agro-industrial complex. Trends observed in milk production have a close impact on the socio-economic development of Ukraine as a whole, and the quality of dairy products for end consumers is an important component of food security.

The situation on the milk market in Ukraine has been unstable in recent years. A negative phenomenon is the decrease in the purchasing power of Ukrainians due to the system of economic and political factors in the country. Access to world dairy markets is complicated by unsatisfactory quality indicators of domestic dairy products and non-compliance with international standards. The development of the industry was also negatively affected by the lack of current state support for milk producers, price disparities in agriculture, and the destruction of the logistics system [4,5].

Analysis of intensive industrial livestock in Europe, the United States and developed countries, as well as the best dairy complexes in Ukraine shows that the outstanding gene pool of new breeds of cattle with high potential for dairy and meat productivity is extremely sensitive to imbalance

nutrients and biologically active substances in traditional diets in the rationing of outdated standards and feeding techniques and requires fundamental improvement of the rationing system, feeding techniques, maximum improvement of quality and biological value of feed in real conditions of high environmental stress in most regions of Ukraine

One of the main trends in the development of equipment for feeding cattle is currently the development and production of a variety of design and functionality of machines for the preparation and distribution of feed. This provides agricultural producers with ample opportunities to complete the optimal fleet of equipment for efficient animal feeding, taking into account all the features of each enterprise: the size of the farm, the level of infrastructure and technical equipment, feeding technology, feed rations and others [6,7]. At the same time, innovative activities are mainly carried out by creating feed mixers, taking into account different levels of infrastructure development and size of enterprises, ensuring high quality feed preparation and improving automated animal feeding systems.

Recently, there has been an increase in consumer demand for self-propelled feed mixers, in order to expand the scope of which manufacturers are actively working to improve their maneuverability, which is achieved through the "three-point" design of the machine chassis. One of the priority areas of development of mixers-feeders, taking into account the different level of infrastructure development of enterprises is their design on a modular basis. This concept is implemented in feed mixers, the design of which can be adapted to different configurations of livestock facilities by installing on the hopper of the machine unloading hatches of different number and design. One of the stages in the implementation of the innovative direction of development of equipment for the preparation and distribution of feed mixtures was the creation of stationary feed mixers, which allows them to be used as small feed mills at livestock facilities of different sizes.

Mixers-feeders with a vertical grinding-mixing system still dominate the European market. This is mainly due to the fact that they provide high quality preparation of the feed mixture while maintaining the structure of the feed. In addition, feed mixers with a vertical grinding-mixing system perform efficient processing of bales and rolls, easy to load from any side, have a simple design, easy to operate and maintain.

To control the feeding process, manufacturers develop software that allows you to: control the work of operators; monitor the results of feeding animals in groups, exchange data with external consultants on online feeding, prepare reports on the use of feed components, etc.

Currently, to address the issue of preparation and distribution of nutrient-balanced feed mixtures on farms, where the use of feed mixers for animal feeding is not possible or inefficient, automated animal feeding systems have been developed and produced. In practice, there are mainly two technological schemes for feeding animals.

According to one of them, the preparation and distribution of feed is carried out by various technical means. Otherwise, the preparation of the feed mixture (dosing and mixing of pre-crushed feed) and its distribution is performed by a suspended feed hopper of the bunker type with advanced functionality (due to the availability of electronic weighing and mixing systems). The technical capabilities of currently available feeders allow you to implement in practice both individual and group feeding, depending on the system of keeping animals.

Recently, automated animal feeding systems have been developed, which are moved not by suspended guides, but in an autonomous mode using modern control systems for the movement of mobile objects. Moreover, when creating the design of such robots, the basis was not suspended feed-feeders, but mobile mixers-feeders. Such innovative developments have already been demonstrated at major international exhibitions.

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