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PROVODING RELIABILITY OF FODDER PREPARATION AND FEEDING MACHINES

Among the large number of machines which are used in livestock there are fodder mixing machines and feed distributors which occupy an important place in farming. If to take into account the high complexity of processes in livestock and the requirements of continuity of technological cycles of preparation, dosage and feeding, it becomes evident the urgency of this issue. One of the important and urgent tasks in cattle breeding of Ukraine is to create conditions for the full-fledged feeding of the cattle. In the last years, the balancing of feed rations with the aim of obtaining high milk production and growth of meat acquires importance. Most of the livestock enterprises of the advanced countries of Western Europe and the United States have switched to the mixing system of feeding, using modern technical means for the preparation and feed distribution [1, 2].

In the last years, for the preparation and feed distribution for the cattle, self-propelled and trailed funds from supplier firms which are in Italy, Sweden, Germany, the USA, Belarus, Russia and other countries come to Ukraine [1 - 3]. It should be noted such Italian companies as "Scariboldi", "Seko", Norwegian "Kverneland", Swedish "DeLaval". The analysis shows that the production of presented analogs is established in Poland, Russia and Belarus. The production of feed distributors of the Swedish company DeLaval Optimix has started in Poland.

Over the past decade, for loading, grinding, mixing, dosing and feeding were effectively introduced self-propelled and trailed funds. Their cost is not always available for agricultural producers in Ukraine. Today, owners and users of these machines, along with economic issues, matters of design, technical characteristics, operation and storage rules, are interested in questions of their reliability in the process of operation and questions of their servicing.

As it known, a considerable number of fodder mixing machines are used today not only with individual faults, but also with significant deviations in the adjustment parameters of the technical components and mechanisms condition. Sometimes, it is very difficult rationally set the work term and service intervals of the machine, choose methods of assessment of technical condition and ways to ensure their operability.

To solve the problems of ensuring the reliability of the "DeLaval" fodder mixing machine, a structural scheme of the reliability of the grinding-mixing mechanism [3] was developed, as a subsystem which most of all limits the reliability of the machine. The structural scheme of reliability includes not only the direct elements which provide the operation of the grinding-mixing mechanism, but also provides for the possibility of various methods of reserving. For instance, displacement of round 120° knives; replacement of operating parts from a set of spare parts; components restoration in case of loss of operability. Let's consider ways of operability ensuring of other subsystems of the mixer fodder machine, using experience of use, maintenance and repair, elimination of failures and machines storage for the preparation and distribution of feeds. We have

formed the structural schemes of the feed loading mechanism reliability of the "DeLaval" fodder mixing machine, as subsystems, which limit the reliability of the system (Fig. 1).

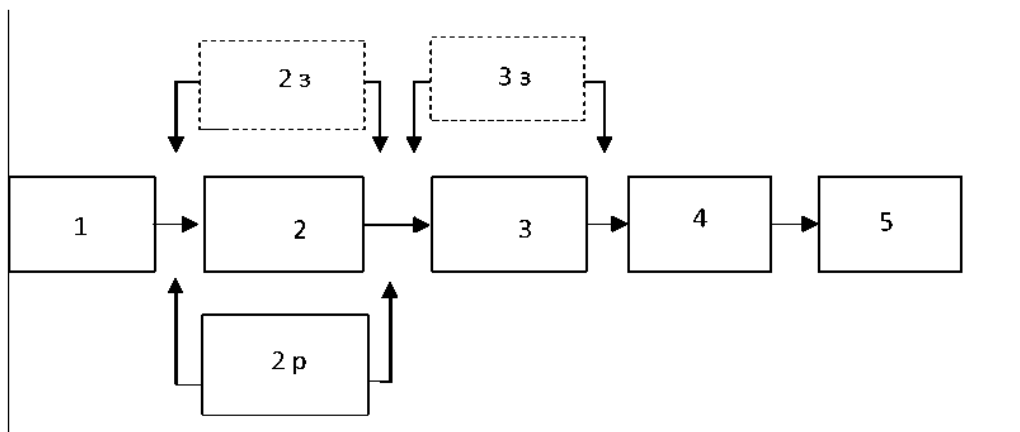


Fig. 1. Structural scheme of the reliability of the loading mechanism: 1 - drum shaft; 2 - blades; 3 - drum shaft bearings; 4 - reducer; 5 - boom of the drum.

The analysis of the loading mechanism reliability is presented in Fig. 1. The structural scheme shows that only two elements provided by spare parts - drum shaft bearings and drum blades. In addition, for the blades of the drum, as a way to ensure the operability, is provided sharpening. That is, to implement the structural scheme, it is required the use of recovery operations, the introduction of an unloaded reserve for elements that limit reliability.

Thus, the analysis of the peculiarities of operating conditions has been carried out. Elements that limit the reliability of feed loading mechanisms have been identified. The presented structural schemes of the mixer mechanisms reliability allow us to consider ways of ensuring their operability by using possible ways of reservations. Promising in this direction could be researches aimed at using graph theory to optimize the structure of complex systems from the standpoint of reliability.

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