Karshiev Fakhriddin Umarovich
Acting professor, Doctor of Technical Sciences (DSc) of Termez State University
https://orcid.org/0009-0003-3067-7418

THE SCIENTIFIC AND TECHNICAL SOLUTIONS FOR FEED PREPARATION AND DISTRIBUTION EQUIPMENT FOR SMALL LIVESTOCK FARMS

Abstract. Small livestock farms play a significant role in ensuring food security and rural economic development. However, feed preparation and distribution remain major challenges due to limited resources and manual labor dependence. This article explores scientific and technical solutions aimed at improving feed preparation and distribution systems in small-scale livestock operations. Innovations in mechanization, automation, and precision feeding are discussed with a focus on their cost-efficiency, practicality, and adaptability to small farms.

Keywords: small livestock farms, feed preparation, feed distribution, automation, mechanization, precision feeding, cost-effective technology.

Аннотация. Небольшие животноводческие фермы играют важную роль в обеспечении продовольственной безопасности и развитии сельской экономики. Однако приготовление и раздача кормов остаются серьёзными проблемами из-за ограниченности ресурсов и использования ручного труда. В данной статье рассматриваются научно-технические решения, направленные на совершенствование систем приготовления и раздачи кормов в мелких животноводческих хозяйствах. Обсуждаются инновации в области механизации, автоматизации и точного кормления с акцентом на их экономическую эффективность, практичность и адаптируемость к условиям малых ферм.

Ключевые слова: малые животноводческие фермы, приготовление и раздача кормов, автоматизация, механизация, точное кормление, экономически эффективные технологии.

Annotatsiya. Kichik chorvachilik xo‘jaliklarining oziq-ovqat xavfsizligini ta’minlash va qishloqlar iqtisodiyotini rivojlantirishda muhim o‘rni bor. Biroq, ozuqa tayyorlash va tarqatish cheklangan resurslar va qo'l mehnatiga bog'liqligi sababli asosiy muammolar bo'lib qolmoqda. Ushbu maqola kichik chorvachilikda ozuqa tayyorlash va tarqatish tizimlarini takomillashtirishga qaratilgan ilmiy va texnik echimlarni o'rganadi. Mexanizatsiyalash, avtomatlashtirish va oziqlantirishni nozik usulda joriy etish borasidagi yangiliklar muhokama qilinib, ularning tejamkorligi, amaliyligi va kichik fermer xo‘jaliklariga moslashishiga e’tibor qaratilmoqda.

Kalit so'zlar: mayda chorvachilik fermalari, ozuqa tayyorlash, ozuqa taqsimlash, avtomatlashtirish, mexanizatsiyalash, aniq oziqlantirish, tejamkor texnologiya.

Introduction. Livestock farming is essential for providing meat, milk, wool, and other animal-based products. In many developing regions and rural areas, small livestock farms contribute to household income and food diversity. However, one of the key challenges faced by such farms is the efficient preparation and distribution of animal feed. Traditional manual methods are labor-intensive, time-consuming, and may lead to nutritional imbalances. To address these issues, innovative scientific and technical solutions are being introduced, offering promising improvements in productivity and sustainability.

Scientific approaches to feed preparation. Feed preparation involves grinding, mixing, and sometimes pelleting or fermenting different raw materials to create a balanced ration. Scientific advancements include: Nutritional Formulation Software: Software tools allow small farmers to calculate balanced rations using locally available ingredients based on the nutritional requirements of different animal species and age groups. Microbial Additives and Enzymes: Adding

probiotics or enzymes to feed improves digestibility and nutrient absorption, which is especially beneficial when using crop residues or fibrous feed. Silage and Haylage Techniques: Improved fermentation processes help preserve high-moisture forages, ensuring feed availability during dry seasons.

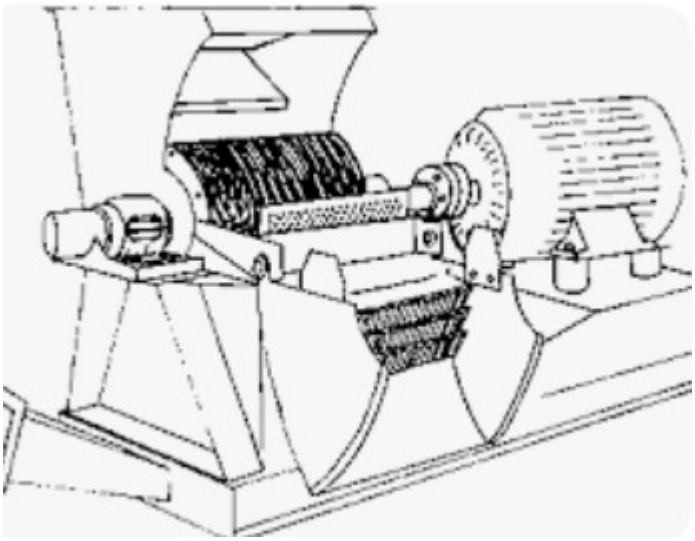
Technical Solutions for Feed Preparation. Technical innovations that simplify and accelerate feed preparation include:

Mini Feed Mills: Compact, mobile feed mills allow small farmers to grind and mix feed on-site. These machines are often solar- or diesel-powered and reduce the cost of outsourcing feed production. Compact, mobile feed mills are an effective solution for small livestock farms looking to improve feed preparation efficiency. These machines allow farmers to grind and mix feed ingredients directly on-site, eliminating the need to rely on external suppliers. Typically powered by diesel engines or solar panels, mobile feed mills are designed to be both energy-efficient and cost-effective. They help reduce feed production costs, save time, and provide flexibility in managing animal nutrition. By using mobile feed mills, small farmers can prepare balanced rations tailored to the specific needs of their livestock, improving overall farm productivity and sustainability.

Chaff Cutters and Forage Grinders: These machines reduce the particle size of forages, increasing palatability and digestibility. Chaff cutters and forage grinders are essential tools for small livestock farms aiming to improve the quality of animal feed. These machines are used to chop or grind forage materials such as grass, hay, maize stalks, and other crop residues into smaller, uniform pieces. By reducing the particle size, these machines enhance the palatability of the feed, making it more appealing to animals. Additionally, smaller feed particles are easier to digest, which improves nutrient absorption and overall animal health. Using chaff cutters and forage grinders not only reduces feed waste but also supports efficient feeding practices and better livestock performance.

Pelleting Machines: Portable pellet mills help in the preparation of uniform, compact feed pellets, which are easier to store, handle, and feed. Portable pellet

mills offer a practical and efficient solution for small livestock farms in preparing high-quality animal feed. These compact machines are designed to convert ground feed materials into uniform, dense pellets. The resulting feed pellets are easier to store, handle, and transport compared to loose or powdered feed. Additionally, pelletized feed reduces waste during feeding and ensures that animals receive a consistent mix of nutrients in every bite. Portable pellet mills are especially valuable for small-scale farmers, as they provide flexibility, save on outsourcing costs, and support on-site feed production tailored to the nutritional needs of their livestock.



In countries such as India, Kenya, and Uzbekistan, small-scale livestock farmers have experienced significant improvements in productivity and animal health after adopting mobile feed mixers and automated feeders. These technologies have enabled farmers to prepare and distribute balanced rations more efficiently, leading to better growth rates, higher milk yields, and reduced feed waste. The successful implementation of these solutions has been largely supported by collaborative efforts from research institutions, agricultural extension services, and non-governmental organizations (NGOs). Through pilot projects, on-farm demonstrations, and rural training programs, these organizations have helped transfer practical knowledge and make modern feed technologies accessible to smallholder farmers.

Conclusion. Scientific and technical innovations in feed preparation and distribution offer significant benefits for small livestock farms. By adopting efficient, affordable, and sustainable technologies, these farms can enhance productivity, animal welfare, and economic viability. Further support through education, subsidies, and technical assistance is needed to scale up these solutions and make them accessible to all small-scale farmers worldwide.

References:

1. Astanakulov, K., Karshiev, F., Gapparov, S., Khudaynazarov, D., & Azizov, S. (2021). Mini crusher-shredder for farms. In *E3S Web of Conferences* (Vol. 264, p. 04038). EDP Sciences.
2. Каршиев, Ф. У. (2004). Мини-дробилка. *Ўзбекистон қишлоқ хўжалиги*, (5), 30.
3. Ыстыкул, К. А. (2016). ОПРЕДЕЛЕНИЕ ПАРАМЕТРОВ ЛАВИН С ИСПОЛЬЗОВАНИЕМ ЦИФРОВОЙ МОДЕЛИ РЕЛЬЕФА. *World science*, *1*(9 (13)), 82-85.