# PRODUCTION OF NUTRIENT-ENRICHED GRANULATED COMPOUND FEED AND ITS EFFECTS ON FISH GROWTH

**Tuxtamishova Gulnoza Karshiboyevna**
*Associate Professor, gtoxtamishova@gmail.com*
*Gulistan State University*
**Xazartkulov Javsurbek Zokirjon o‘g‘li**
*Lecturer, Gulistan State University*
**Xaydarova Durdona Xudoyberdi qizi**
*3rd-year student, Faculty of Manufacturing (Industrial Engineering), Gulistan State University*

**Abstract:** *The presented article describes the technology for producing enriched pelleted feed. The production of compound feed is a complex process in which various components are mixed to produce nutritious pelleted feed for fish. Compound feed can also be produced for other types of animals, including cattle, poultry, and other domestic animals. The article discusses the main stages of compound feed production, including the selection and preparation of raw materials, mixing, and packaging. It also examines various mechanical and chemical processing technologies used to improve the nutritional value of the product, as well as issues related to the quality and safety control of fish feed. All these aspects of compound feed production ensure the creation of a high-quality product that meets the nutritional needs of fish and market requirements.*

**Keywords:** *Compound feed, soybean meal, production technology, nutritional value, feeding, premixes, minerals.*

Study of the Main Processes of Feed Production Technology Compound feed production technology is an important part of modern agricultural farming. Compound feed is a mixture of various nutrients, such as grains, seeds, meals, premixes, and vitamins. This mixture provides animals with the essential nutrients they need and meets the nutritional requirements of different animal species.

The production of compound feed begins with the selection of high-quality raw materials. The proportions of different feed ingredients are calculated according to the type of animal for which the feed is intended. For example, compound feed for fish contains a high percentage of grains and protein, as well as essential vitamins. After the ingredients are selected, they undergo mechanical processing and are mixed. This process is carried out in specialized feed mills, where the raw materials are first ground into fine particles and then thoroughly mixed. Mechanical mixing ensures the uniform distribution of nutrients and vitamins throughout the feed.

After the feed ingredients are mixed, premixes and vitamins are added. Premixes are concentrated supplements that contain minerals, vitamins, and other nutrients. They are added to the feed in carefully calculated amounts to ensure the optimal balance of nutrients in the final product. Compound feed must undergo mandatory quality and safety testing. Specialists

collect feed samples and examine them for the presence of pathogenic bacteria, pesticides, and other harmful substances. The purpose of these tests is to ensure the safety and quality of the feed, as well as to prevent the spread of infections and other diseases.

Feed Raw Material Reception

Reception of bulk raw materials: Bulk raw materials transported by truck or rail are weighed on a scale and unloaded into a receiving pit.

Reception of bagged raw materials: This process is divided into manual handling and mechanical reception.

Reception of liquid raw materials: Liquid raw materials stored in bottles or barrels can be transported manually and unloaded directly.

Feed Raw Material Storage

There are many types of raw materials used in compound feed production; therefore, different types of storage facilities are required. In a feed pellet production plant, two types of storage units are commonly used: silos and warehouses (storage buildings). Main raw materials, such as grains, have good flowability and are not easily compacted, so they are stored in silos. By-products such as bran, soybean meal, and other powdered raw materials have poor flowability and tend to form lumps during long-term storage; therefore, they should be stored in warehouses.

Cleaning of Raw Materials for Compound Feed

Impurities present in feed raw materials not only affect the quality of the final feed product but also have a direct impact on the safety of feed processing equipment and plant operators. In severe cases, the equipment may even fail completely, disrupting the continuous operation of feed production. Therefore, these impurities must be removed promptly. The cleaning equipment used in feed mills mainly consists of screening and magnetic separation systems. Magnetic separators are primarily used to remove iron impurities.

Grinding of Feed Raw Materials

The feed grinding process is determined according to the required particle size and the type of feed being produced. Depending on the grinding stage, the process is classified into primary grinding technology and cyclic grinding technology (also known as secondary grinding). According to the method of combining grinding with batching, it can be divided into a process in which batching is carried out first followed by grinding, and a process in which grinding is performed first followed by batching.

Primary Grinding Technology

This is the simplest, most commonly used, and most basic grinding process. It is applied whether a single type of raw material or a mixture of several raw materials is being ground. Depending on the number of grinders used, the process is classified into single-machine grinding and parallel grinding. Small feed processing plants mainly use single-machine grinding, while medium-sized feed processing plants generally employ two or more grinders operating in parallel.

Secondary Grinding Technology

There are three types of secondary grinding processes: the single-cycle grinding process, the staged grinding process, and the combined grinding process. In the single-cycle secondary

grinding process, one grinder is used to grind the material, after which it is screened. The material remaining on the screen is returned to the grinder for further grinding. In the staged secondary grinding process, batching is carried out before grinding. According to the feed formulation, the ingredients are weighed, mixed, and then transferred to the grinder for processing. In the grinding-before-batching process, the raw materials are first ground and then transferred to the batching bins, after which they are weighed and mixed.

Compound Feed Batching Technology

All components added to compound feed must be uniformly distributed so that they are digested evenly in the animal' s body. This means that a specified amount of one nutrient should always correspond to the required amount of the other nutrients. Only under these conditions can the feed produce the desired results indicated in the formulation, such as increased egg production, greater weight gain, or higher milk yield. Therefore, each unit of compound feed must contain the prescribed amount of every ingredient, and all components must be thoroughly mixed.

At present, various batching technologies are widely used in compound feed production. These include manual batching of feed additives, volumetric batching, single-bin batching with one scale, multi-bin batching with multiple scales, batching of several bins using a single scale, and other similar methods.

Compound Feed Mixing Process

The mixing process can be divided into two types: batch mixing and continuous mixing. Batch mixing involves combining all feed ingredients according to the proportions specified in the feed formulation and transferring them to a batch mixer for blending. This method allows feed formulations to be changed easily, and the mixing time between batches is relatively short. As a result, it is the most widely used mixing method. Since starting and stopping the process occurs frequently, batch mixing is usually controlled by an automatic operating system.

Continuous mixing involves continuously measuring all feed ingredients at the same time and feeding them into the process in proportion to the required flow rate of each component. As the materials enter the continuous mixer, they are continuously blended into a uniform feed mixture. The main advantage of this process is that it operates continuously and can be easily integrated with grinding and pelleting operations. It also requires fewer manual operations during production. However, changing the feed formulation is more difficult because the flow rates of the ingredients must be adjusted accurately. In addition, the material remaining inside the continuous feeding and mixing equipment can cause mixing between two different feed batches, making cross-contamination a more significant issue.

Compound Feed Pelleting Process

Conditioning: Conditioning is one of the most important stages in the feed pelleting process. The quality of conditioning directly affects the quality of feed pellets. The purpose of conditioning is to harden the dosed and mixed powdered materials, allowing them to be easily processed into feed pellets. Currently, the most commonly used method of conditioning in feed processing plants is the addition of steam. Feed Pelletizing Ring Die Granulator: After conditioning, the material is evenly distributed between the pressure roller and the ring die,

allowing it to enter the compression zone. The material is continuously pressed by the pressure roller and forced through the holes of the ring die, forming cylindrical feed pellets. As the ring die rotates, the pellets are cut to the required length by cutting knives fixed inside the granulator.

Flat Die Granulator: The mixed material enters the granulation system. A rotating distributor located at the top of the granulation system evenly spreads the material over the flat surface of the die (plate). The material is then pressed into the die holes and pushed out from the bottom. The rod-shaped feed produced through the die holes is cut into the required length by a cutting knife.

Grinding

In the production of animal feed pellets, especially for young poultry or livestock, pellets are often first processed into larger sizes and then crushed into smaller particles. This process helps save energy, increase productivity, and improve feed quality.

**Conclusion**

Compound feed production technology plays an important role in aquaculture and provides fish with the essential nutrients required for their health and growth. The production of compound feed requires careful attention to the quality of ingredients, the correct composition of the feed mixture, and the safety of the final product. Modern technologies and production processes simplify this procedure, allowing the optimal feed composition to be calculated in advance and ensuring high product quality.

**References:**

1. Boboyev S.D., AdizovR.T., Ergasheva X.B., Toirov B.B., Tursunova N.N. «Omixta yem ishlab chiqarish». Toshkent.: «Ilm Ziyo», 2004 y.

2. Егоров Г.А. и др. Практикум по технологии муки, крупы и комбикормов. М., Агропромиздат, 1991 г.

3. Husnirabo Ergasheva omixta yem ishlab chiqarish texnologiyasi o‘quv qo‘llanma yoshlar nashryot uyi Toshkent – 2020 213 bet.

4. Nurmukhamedov, A. A., Jankorazov, A. M., Khazratkulov, J. Z., & Tashmuratov, A. N. (2023). Methods of Improving the Frying Process in the Production of Vegetable Oils. Journal of Advanced Zoology, 44(S-2), 1961-1969.

5. Yusupov, T. N., Solijonov, G. K., Uzaydullaev, A. O., Kuzibekov, S. K., & Jankorazov, A. M. (2023). METHODS OF STUDYING MEASUREMENTS AND ERRORS OF INTERNATIONAL STANDARD REQUIREMENTS. Евразийский журнал академических исследований, 3(6 Part 2), 49-55.

6. Solijonov, G., Uzaydullaev, A., Kuzibekov, S., & Jankorazov, A. (2023). THE ROLE OF STANDARDIZATION IN THE INDUSTRY AND THE ANALYTICAL METHODS OF PRODUCT CERTIFICATION. Science and innovation, 2(A3), 144-149.

7. Javsurbek, K., Abror, J., Akhmad, N., & Shakir, I. (2023). REQUIREMENTS FOR THE QUALITY OF RAW MATERIALS PROCESSED IN THE INDUSTRY. Universum: технические науки, (1-4 (106)), 47-49.

8. Khazratkulov, J. Z., & Tashmuratov, A. N. (2023). STUDYING METHODS OF IMPROVING THE PROCESS OF APPLE JUICE PRODUCTION. International Bulletin of Engineering and Technology, 3(4), 38-42.

9. Karshievich, S. K., & Uli, K. J. Z. (2021). Dependence of the Content of Trans-Isomerized Fatty Acids on Hydrogenate Indicators. Central Asian Journal of Theoretical and Applied Science, 2(10), 27-30.

10. Xazratqulov, J. Z., & Raxmatov, F. E. (2023). ORGANIZATION OF THE PRODUCTION OF SOFT FEED FOR FISH FARMS GROWN IN LOCAL CONDITIONS. Евразийский журнал академических исследований, 3(12), 126-129.

11. Тухтамишева, Г. Қ., & Саттаров, К. К. (2021). Махалий буғдой донидан юқори сифатли унларни олиш технологияси. Scientific progress, 2(4), 1003-1101.

12. Barakaev, N. R., Kurbanov, J. M., Uzaydullaev, A. O., & Gafforov, A. X. (2021, September). Qualitative purification of pomegranate juice using electro flotation. In IOP Conference Series: Earth and Environmental Science (Vol. 848, No. 1, p. 012024). IOP Publishing.

13. Саттаров, К. К., Тухтамишева, Г. К., & Нуриддинов, Б. Р. (2021). Совершенствование технологии получения муки из зерна пшеницы. Образование и право, (7), 236-241.

14. Solijonov, G. K., Uzaydullaev, A. O., Kuzibekov, S. K., & Jankorazov, A. M. (2023). SANPIN RULES AND METHODS OF FOOD WASTE ANALYSIS. Евразийский журнал академических исследований, 3(11), 52-56.