TOPIC XXI. REQUIREMENTS FOR THE QUALITY OF COMBINED FUEL

PLAN:

1. **General description of feed and compound feed.**
2. **Types of compound feed.**
3. **The significance of various nutrients in feed.**
4. **Assessment of the nutritional value of compound feed..**

GLOSSARY (ГЛОССАРИЙ)

Uzbek	Russian	English	Content
Omuxta yem	Комбикорм	Compound feed	A feed mixture prepared from various feed components in specified proportions for feeding livestock, poultry, and other animals.
Oziqaviy qiymat	Пищевая ценность	Nutritional value	The degree to which compound feed provides the animal's body with energy, proteins, fats, carbohydrates, minerals, and other substances.
Mineral moddalar	Минеральные вещества	Mineral substances	A complex of calcium, phosphorus, sodium, magnesium, and other mineral elements necessary for the animal body.
Vitaminlar	Витамины	Vitamins	Biologically active substances that ensure the normal growth, development, and metabolism of the body.
Xom kletchatka	Клетчатка сырая	Raw fiber	The sum of difficult-to-digest components of plant raw materials.
Mexanik aralashmalar	Механические примеси	Mechanical impurities	Soil, stones, metal, glass, and other foreign objects that accidentally entered the composition of the compound feed.
Yem xavfsizligi	Безопасность кормов	Feed safety	The condition of compound feed that does not harm animal health or product safety.

General description of feed and compound feed.

Products of plant and animal origin, as well as mineral substances, serve as food for farm animals. In livestock practice, feed is divided into coarse, juicy, concentrated, mineral, and various industrial waste depending on its origin, consistency, and nutritional value.

Further improvement in its effectiveness can be achieved by feeding animals feeds in the form of compound feed rather than by feeding them separately. Mixed feeds are products obtained by combining 6–12 types of various food products (components, ingredients) according to a recipe. Ingredients used in compound feed production are cleaned, shelled, and ground if necessary, then starched and mixed.

Compound feeds are produced depending on the species of livestock, poultry, and fish, as well as their feed and feeding purposes. Compound feeds contain all the nutrients necessary for domestic animals.

The introduction of compound feed into the diet significantly increases the productivity of animals, poultry, and fur-bearing animals; they grow and develop well, and their vital activity increases. If the daily diet of animals and poultry is always the same, their productivity will decrease, there will be a lag in the growth and development of young animals, a slowdown in their vital activity, and an increase in various diseases.

By increasing the production of compound feed, an increase in livestock productivity is achieved, i.e., an increase in animal weight, an increase in egg production by chickens, a positive change in the quantity and quality of milk obtained from cows, etc.Proper use of compound feed contributes to a reduction in production costs in livestock farming.

2. Types of compound feed.

According to their physical state, the following types of compound feed are distinguished: marketable, briquetted, granulated, and in the form of dumplings.

A bulk compound feed is a sufficiently homogeneous crushed product. In the production of bulk compound feed, ingredients are cleaned of foreign impurities, peeled, and ground. The ingredients prepared in this manner are passed through a mixer and a mixer.

Briquetted compound feed is typically produced with a complete ration. Briquettes are octagonal in shape, with a length of 160–170 mm, a width of 70–80 mm, and a thickness of 30–60 mm. To produce them, a mixture of ground ingredients and ground hay is prepared. The resulting flowable mass enters a special mixer, from which starched and dispersed molasses are simultaneously transferred. The mass, consisting of a mixture of crushed ingredients, hay, and molasses, is pressed and briquetted.

Granular compound feed a flowable mass consisting of small cylinders of known diameter and height, called a granule. Two methods are used in the production of granules: dry and wet. Granulated compound feed is typically used for feeding poultry and pond fish.

Gallets. It takes the form of a rectangular flatbread with a hole. For the production of dumplings, the starter mixture is first taken, then a yeast dough is made from it, and dumplings are baked and dried.

Based on their composition and feed-forage value, compound feeds are divided into 2 main groups: complete rations and concentrates.

3. The significance of various nutrients in feed.

Dry matter. When organizing standardized feeding of animals, it is necessary to take into account their need for dry matter and the amount of dry matter in the diet. The amount of dry matter in the food or diet is an important indicator of nutritional value. The consumption of dry matter depends on many factors; the ration depends on the variety of feeds, the structure of the ration (feeding type), energy concentration, feed quality, their taste and physical properties, preparation for feeding, livestock productivity, the digestion of nutrients, and so on.

The more difficult the dry matter in the diet is to digest, the less it is consumed by animals, especially highly productive cattle. For example, when feeding dairy cows, the amount of digestible dry matter in the diet should be at least 60 percent. The consumption of dry matter by animals depends, in addition, on the composition of the diet and its balance with essential nutrients. This forms the basis of full-fledged nutrition.

High-yielding cows are more demanding of the energy concentration per 1 kg of dry matter in the ration.

Units of exchangeable energy and nutrients. The sources of energy exchange are carbohydrates, fats, and proteins that enter the animal's body with food. The amount of energy metabolism depends on the ratio and concentration of the main nutrients in the diet, as well as their digestion and absorption.

In the new livestock feeding norms, along with their energy metabolism needs, the temporary normalization of energy per oat feed unit is also preserved.

Protein. Protein plays a very important role in the nutritional nutrition of animals. Proteins are the main constituent of every living organism. The vital activity of animals is linked to the formation and breakdown of proteins in their bodies. Cows must receive a sufficient amount of protein along with the feed to produce their own body protein and milk protein. The quality of food proteins, called proteins, varies.

A pure protein contains proteins and amides, i.e., nitrogenous compounds that are not characteristic of a protein. In food, amino acids are found not only in proteins but also in free form. According to zootechnical analysis, free amino acids belong to the conditional groups of amides.

Some amino acids are considered non-substitutable, i.e., others cannot replace them in food, and their deficiency leads to a decrease in animal productivity and metabolic disorders. Non-exchangeable amino acids include lysine, tryptophan, histidine, leucine, isoleucine, phenylalanine, threonine, methionine, valine, and carotene. These acids are not formed by other nitrogenous substances in the animal body. They enter the animal's body only with food. Proteins that do not contain these amino acids at all or in small quantities are called incomplete.

The new feeding standards for farm animals take into account their needs for raw and digestible protein.

Carbohydrates. Carbohydrates are the main component of dry substances in plant food and serve as the primary energy source for animals. According to zootechnical analysis, all carbohydrates are divided into two groups: raw fiber and non.

Raw cellulose consists of cellulose (cellulose), hemicellulose fragments, and texturing substances (lignin, kutin, suberin). Cellulose forms the basis of the plant cell cortex. As cellulose is saturated with lignin during plant development, the cell walls harden. It consists of hemicellulose, pentase, and hexose sugars and serves as a reserve nutrient in the bark of plant cells.

Non-nitrogenous extractants include sugar, starch, a portion of hemicellulose, inulin, inorganic acids, glucosides, and other substances.

Non-nitrogenous extractants include sugar, starch, a portion of hemicellulose, inulin, inorganic acids, glucosides, and other substances. Among them, sugars and starch are of great importance in the nutrition of animals. Starch is a reserve source in plants and is found in large quantities in seeds, fruits, and tubers, and in small quantities in leaves and stems. They are found in foods mainly in the forms of glucose, fructose, maltose, sucrose, and fructose. Milk contains lactose or sugar, and the liver contains glycogen.

Nitrogen-free extract substances, particularly sugars and starch, are nutritious not only for animals but also for microorganisms present in the anterior stomach of animals, and are used by them to form bacterial proteins.

Carbohydrates are absorbed into the abdomen of animals in the form of sugar, starch, hemicellulose, cellulose, and certain other compounds. Complex carbohydrates are broken down into simple sugars by large intestinal microorganisms, which, in turn, ferment into acetic, butyric, propionic, and other acids. Sugars are an excellent source of energy for animals and their large abdominal microorganisms. An optimal sugar-to-protein ratio in an animal's diet creates favorable conditions for the development of microflora in the anterior stomach, and the synthesis of amino acids, fatty acids, and Group B vitamins in the abdomen is improved.

Starch is one of the primary energy sources in the diet and performs the same function in the body as sugars.

Fiber performs the function of normalizing digestion in the abdomen. It is broken down by microorganisms in the anterior stomach and the large intestine. Fiber in the diet has a positive effect on increasing the milk content of ruminants. However, an excess of fiber in an animal's diet reduces the absorption of nutrients and the effectiveness of their utilization.

Fats. During the zootechnical analysis of feed, raw fat is also identified. In addition to natural feed, raw feed includes wax, chlorophyll, resin (vegetable juice), coloring agents, organic acids, phosphatites, sterol, and other compounds. Fats contain carbon, hydrogen, and oxygen in various combinations. Due to the fact that fats contain less oxygen and more carbon and hydrogen than other

nutrients, they release 2.25 times more energy during the oxidation process than carbohydrates. Therefore, these foods are high in calories.

The role of fats is not limited solely to their energy value. Fats, as structural elements, are part of the protoplasm of cells. Certain fatty acids (linol, arachidone, linomen) are mandatory for animal intake as they are necessary for growth, development, and the normal course of metabolic processes. Moderate amounts of feed are important for good animal appetite and the normalization of digestion and intestinal absorption. Along with food, the body receives food-soluble vitamins.. Due to a lack of fat in the feed, the animal body suffers from a deficiency of fat-soluble vitamins A, D, E, K.

Mineral substances. If mineral substances do not have energy value, they are of great importance for feeding livestock. This is because they actively participate in all metabolic processes occurring in the body.

When organizing targeted animal feeding, it is necessary to regulate the content of calcium, phosphorus, sodium, chlorine, magnesium, potassium, sulfur, iron, zinc, manganese, copper, cobalt, and iodine in the diet. In some cases, the amount of fluorine, bromine, selenium, and molybdenum in the diet must also be taken into account. Furthermore, in recent years, due to environmental pollution and the use of chemical and microbiological technologies in supplementary food production, accounting for the content of mercury, lead, and strontium in the diet has become increasingly important.

When organizing complete nutrition for animals, it is necessary to take into account that mineral substances are in a complex relationship with each other and other nutritional factors. A very close relationship has been established between calcium, phosphorus, and magnesium; between zinc and copper; between potassium and magnesium; between sodium and potassium; between copper and iron; and between copper and molybdenum.

The need of animals for mineral substances depends on many factors, primarily on the relationship of individual elements to each other during metabolism, the degree of their displacement and excretion, and the amount of accumulation in the body.

Vitamins. Vitamins are essential for predicting the normal functioning of the body, healthy animal growth, high productivity, and the normalization of reproductive functions. Vitamins play a particularly important role in the intensive development of animal husbandry. If a vitamin deficiency occurs in the diet, livestock productivity decreases, and metabolic disorders are observed in their bodies.

4. Assessment of the nutritional value of compound feed.

Scientific foundations of concentrated feed for farm animals and birds. Assessment of the nutritional value of compound feed. The digestibility of compound feed is determined based on special experiments performed on animals. The digestibility of individual nutrients in compound feed is expressed as a percentage. The structure of the digestive apparatus varies among different animals. Therefore, the digestion of the same compound feed by different species of animals varies. The nutritional value of each compound feed is characterized by the final result of feeding, i.e., productivity.

The nutritional value of compound feed and feed products is considered a feed unit and is equivalent to the nutritional value of 1 kg of oats with a moisture content of 13% and a bulk density of 450–480 g/m3. Taking into account the importance of protein in animal feed, the indicator of the amount of wet protein is used alongside the feed unit when evaluating log feed products.

When evaluating compound feed, the number of feed units is taken per 100 kg of compound feed, and the amount of moist protein is expressed in %. The nutritional value of poultry feed is estimated by the amount of exchangeable energy expressed in kilocalories per 100 g of feed:

Depending on the amount of energy in the compound feed and the level of utilization by the body, it is divided into total, exchangeable, and productive types. The amount of total heat generated by the combustion of feed outside the body is called total energy. Part of the exchangeable energy is spent on predicting the exchangeable processes in the organism, while the remaining part—pure, or productive, energy—is spent on characterizing the product.

Evaluating compound feed by the amount of exchangeable energy is a relatively simple and accurate method. This method shows how much of the feed's energy is spent on the growth of the poultry organism, egg production, body temperature regulation, and other physiological processes. The nutritional value of fur-bearing animals is assessed by the calorific value of 100 g of compound feed, as well as the amount of moist protein, fiber, and micro-additives. Additionally, when evaluating the nutritional value of compound feed, the content of specific amino acids, fiber, minerals, and vitamins is taken into account.

In addition, there are technological indicators of compound feed quality: the size of the crush, the amount of whole cereal seeds, and the amount of metal-magnetic impurities.

The quality of compound feed is regulated based on state standards and technical specifications. Depending on the designation of the compound feed (for cattle, calves, meat-fed pigs, chicks, laying hens, etc.), the nutritional value of its various feed products varies within a wide range. Maximum norms for the inclusion of individual components in compound feeds for animals of various species and ages have been established.

Keywords: *Compound feed, nutritional value, feed quality, feed safety, moisture, raw protein, fat, fiber, mineral substances, vitamins.*

REVIEW QUESTIONS

1. How is the feed industry developing in our country?
2. Provide a general description and types of compound feed.
3. What is the chemical composition of compound feed?
4. What is the significance of nutrients in feed?
5. Describe the general characteristics of technical processes at feed mills?

KEY FINDINGS:

1. The quality of compound feed directly affects the growth, development, productivity, and health of animals.

2. High-quality compound feed must contain protein, fat, carbohydrates, vitamins, and minerals in normal proportions.

3. If the moisture content of the feed exceeds the established norm, the development of microorganisms, mold formation, and the spoilage of the feed accelerate.

4. Compound feed must not contain toxic substances, mycotoxins, harmful microorganisms, or foreign impurities in excess of the permissible limit.

Self-study topics

1. Yormani boyitish mashinalari.
2. Yorma ajratgich va yormani saralash mashinalari.
3. Omuxta yem xom ashyolarini tozalashga mo‘ljallangan mashinalar.

Information and methodological support:

1. Shaumarov Kh.B., Islamov S.Ya. Technology of storage and primary processing of agricultural products Tashkent "Innovation-Ziyo." 2020. Study guide.

2. Ravshanov S.S., Ismatov N.A., Yuldasheva Sh.J. Modern technologies for the production of flour groats. Textbook "Navruz Publishing House" 2020-363 p.

3. Z.M. Mukimov. "Grain Storage and Processing Technology" Textbook, Tashkent "Innovative Development Publishing and Printing House" 2021. p. 334.

4. K.K. Sattarov, G.K. Tukhtamishova, A.O. Uzaydullaev, S.K. Kuzibekov, A.M. Jankorazov, "Technology for Storing Grain and Grain Products." Educational manual "Ziyo nashriyot" LLC Gulistan 2024.

5. O. Rakhmatov, S.S. Tukhtamyshev, R.Kh. Khudayberdiev, I.R. Makhmudov, D.Kh. Yuldasheva. Grain storage and processing technology. Tashkent - "NIF MSH" Publishing House.2024, -160 p.

SELF-CONTROL TESTS:

Test samples

1. What is compound feed?

A. A feed mixture prepared from various nutrient components in specified proportions

V. A product consisting only of mineral substances

B. Feed prepared exclusively from grain products

G. Vegetables provided only for livestock

2. What consequences can a high moisture content of compound feed lead to?

A. Molding and the development of microorganisms

V. Sterility of the feed

B. Extension of the shelf life

G. Automatic increase in nutritional value

3. What are the organoleptic indicators of compound feed quality?

A. Color, smell, and appearance

V. Only protein content

B. Only the amount of moisture

G. Only the amount of mineral substances

4. What are mycotoxins?

A. Toxic substances produced by mold fungi

V. Protein compounds

B. A type of vitamin

G. Mineral substances

5. What is the name for the uniform distribution of compound feed components?

A. Homogeneity

V. Wetting

B. Drying

G. Sterilization