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Development Of Compound Feed Recipes In The Composition Local Raw Materials

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ABSTRACT

The object of research is the development of compound feed recipes from local oilseeds grown in Uzbekistan. The purpose of this study is to correctly compile a feed recipe, determine the quality and protein content of feed and digestibility use rich protein nutritional value in feeding farm animals for fattened cattle to produce a batch of feed. The conditions for obtaining high-quality feed food for wide use in industrial feed production are defined.

KEYWORDS

Cotton meal, safflower meal, sunflower meal, soy meal, digestible protein, amino acids, mineral components, corn, grain, nutritional value, technology, pelletized.

INTRODUCTION

The modern development of animal husbandry and poultry farming in close connection with the expansion of feed production, incl. various meals from unconventional raw materials.

The need to intensify all sectors of animal husbandry, without which the transition to market conditions of management is impossible, significantly improve the role of

the feed industry. High-grade compound feed reduces the consumption of forage by almost a third. However, in our farms, compound feed in concentrated feed is less than 50%, as a result, the republic receives less (in terms of meat) 250 thousand tons of products, overspending up to 800 thousand rubles. tons of grain, due to which its cost increases by one and half times.

The main reason is the lack of digestible protein and essential amino acids in the diet, which makes up 30-35 percent of the required amount. The problem of providing feed with digestible protein is being successfully solved in many countries of the world community

It is well known that in the United States the degree of intensification of animal husbandry is largely determined by the level of consumption of concentrates. Therefore, their share in the diets of broilers is 100%, pigs - 96%, fattening cattle - 67%, dairy cattle - 40%.

Uzbekistan has very significant resources of raw protein components for the feed industry. These are mainly cotton, safflower, corn, rapeseed and soybean meal.

The feed industry can be divided into 4 groups:

- Large firms that own a large number of feed mills, which are often part of agro-industrial complexes (this includes large cooperatives);
- Relatively small firms and small cooperatives that own a small number of feed mills;
- Small firms with one plant;
- Factories belonging to fattening farms and poultry farms.

The combined feed industry in the regions produces high-grade compound feed, which is called primary, as well as various protein-vitamin, mineral and other components, on the

basis of which farms, adding grain, produce the so-called secondary compound feed. The former are balanced in all nutrients and can serve as the only food source for multilined animals; the latter are produced mainly in small factories and installations directly on farms for the production of milk, beef, pork, fish, eggs and poultry meat. 90% of the produced compound feeds are primary, the rest are secondary.

METHODS

In order to expand the possibility of using rich protein nutritional value from local raw materials in feeding farm animals, compound feed recipes were developed for fattening cattle for the production of a batch of compound feed.

It is known that the nutritional value and type of feed have a significant effect on the growth rate of animals, the formation of muscle tissue, the mass of internal organs, the concentration of hormones, the metabolic parameters of proteins and lipids, and the composition of fatty acids of the latter.

Today, the main problem in animal husbandry is low profitability, which is a consequence of the use of ineffective feed technologies. Moreover, the use of outdated approaches to feeding, which leads to large losses of meal, etc. To achieve such a balance, non-traditional food and biological additives are used in the composition of the meal.

In Uzbekistan, the main type of meal produced at fat and oil enterprises is cotton, which, along with useful components, contains technical gossypol and its derivatives, which must be reduced as much as possible.

In animal feeding, proteins, carbohydrates, fiber, chlorophylls, carotenoids, phosphatides, tocopherols, sterols, vitamins and

microelements are of great importance. Safflower is an ancient crop called the "Southern" sunflower. Safflower seeds are cultivated mainly in southern Kazakhstan. The oil obtained from the hulled seeds is used for food purposes, and from the unhulled seeds - in the production of paints and varnishes and soap making. The meal is used to feed livestock and birds.

Meal is a high-protein product containing up to 40% protein, up to 2% vegetable oil and the aforementioned biologically active substances.

One of the ways to solve this practically important problem is to create compositions using a mixture of safflower or soybean meal.

Meal obtained from safflower and soybean seeds contains a lot of crude fiber (up to 45%), for which it is reluctant to be eaten by animals and birds. They contain less minerals than cottonseed meal, but they are a good source of calcium, phosphorus and iron. In terms of the content of vitamins, safflower meal is somewhat superior to cotton, soybean and others, although it contains little vitamins B6 and E (tocopherol) [2].

Therefore, it is advisable to use safflower meal as a vegetable protein supplement in feed, partially replacing cotton meal, thereby reducing the toxicity of gossypol, which contains in the latter.

For example, in the USA [3], 2 types of safflower meal are produced: the first with high and the other with low fiber content, which contains 16-24% protein and 30-37% fiber. Moreover, safflower meal contains less (than cottonseed) amino acids.

RESULTS

We proposed changes in the content of free gossypol in the composition depending on the

ratio of the amounts in the mixture of toasted cotton and safflower (sunflower, soybean) meals. The content of free gossypol in the meal composition was determined according to the standard [4].

An increase in the proportion of cotton meal (or with a decrease in the content of safflower, sunflower or soybean meal) in the composition increases the content of the mass fraction of free gossypol. Moreover, a deviation from the requirements of the standard [5] was observed after an increase in the content of cotton meal by more than 80% in terms of absolutely dry matter.

As noted earlier, the meal composition is mainly determined by the feed value by the content of the mass fraction of crude protein and crude fiber, which are determined by methods [6] and [7], respectively.

Upon reaching the content of safflower meal (sunflower, soybean) in the composition is equal to 50%, which determines the rational ratio of the components in the resulting mixture. The composition of cotton and safflower meal meets the requirements of the standard [5] with the content of the latter less than 20% by weight of absolutely dry matter.

Changes in the composition of the total energy nutritional value (GER) depending on the ratio of the amounts in the mixture of toasted cotton and safflower (sunflower, soybean) meal.

Therefore, to ensure economy and greater efficiency of feed, it is necessary to reduce the deficiency of proteins and balance the composition of the composition in such a way as to close the gap between the amount of feed consumed and its quality. To achieve such a balance, non-traditional food and biological

additives are used in the composition of the meal.

Based on the foregoing, it must be borne in mind that when feeding animals on farms, there is an acute protein deficiency. There is reason to assert that the deficiency of these substances can be significantly covered by cake and oilseed meal obtained in the production of oil, as well as hay, silage and green fodder from safflower stalks and leaves.

Thus, the studies carried out confirm the feasibility of introducing safflower meal into

the composition as a biologically active additive. For example, a composition consisting of 80% cotton meal and 20% safflower (corn, sunflower or soybean) meal in terms of its main physicochemical and feed characteristics must meet the requirements of the standard [5].

The main indicators of safflower cake and meal have been investigated; a formula for the production of compound feeds using safflower oilcake and meal has been developed.

Table 1

Composition of compound feed

Component name	on prescription №1	on prescription №2	on prescription №3
Barley	4,0	4,0	3,0
Bran	64,9	59,9	55,9
Side effect. until 71-85%	12,0	12,0	12,0
Side effect. until 50-70%	13,0	13,0	13,0
Safflower cake	5,0	10,0	15,0
Flour is known..	1,1	1,1	1,1
Total, % input	100	100	100
Feed units.	74	74,0	72,0
Crude protein, %	14,0	15,0	15,0
Fat, %	0,35	0,7	1,05

Based on the valuable composition of the safflower cake and meal, we have developed recipes that improve the feed value (protein and fat content).

In recipe # 1, a compound feed was prepared with the addition of 5% safflower cake (Table 1):

In recipes 2 and 3, the compound feed was obtained with the addition of 10 and 15% safflower cake (Table 1):

It was also studied by us, safflower meal in a composition with other components, it is advisable to use it as a vegetable protein supplement in feed, partially replacing cotton meal, thereby reducing the toxicity of gossypol containing in the latter. Since safflower meal

contains fewer amino acids than cottonseed meal.

In Uzbekistan, the main type of meal produced at oil and fat enterprises is cottonseed, which contains technical gossypol with useful components.

Table 2.

Composition of nutritional value of compound feeds (PC)

Composition,%	Compound feed options	
	Nº1 (standard)	Nº2 (the proposed)
Barley	27,4	30,0
Sunflower meal	3,5	6,5
Soybean meal	-	6,5
Cotton meal	-	15
Safflower meal	10,5	15,5
Wheat bran	20,5	25
Corn	26	30
Monocalcium phosphate	0,3	0,5
Monosodium phosphate	1,0	1,0
Table salt, g / gol / day	100	120
Минвит-6, g / gol / day.	150	200
Content in compound feed, in 1 kg of dry matter		
Dry matter (DM), g	907,5	903,4
Crude protein (CP), g	141,7	132,0
Digestible protein (DP), g	110,5	101,1
Breakdown Protein (BP), g	100,0	90,5
BP,% of CP	68,0	66,5

Zola, g	23,5	22,5
Crude fat (CF), g	45,1	55,0
Crude fiber (CF), g	52,1	45,0
Easily hydrolyzed carbohydrates, g	65,5	60,5
Phosphorus, g	8,5	7,8
Calcium, g	2,10	1,8
Digestibility %	57,5	60,50

From table. 2 it can be seen that the recipe developed by us is a more mildly expressed compound type of compound feed. The previously compiled recipe for the nutritional value of mixed feed for livestock and laying hens changes over time, the enrichment of the existing compound feed recipe.

Compound feeds are produced according to special recipes, which indicate the types of components and their content in this compound feed. Recipes are based on the type of animals, birds or fish, their age, economic orientation (dairy, beef, breeding cattle, etc.).

We have also developed a recipe for young animals.

Table 3

Compound feed recipes

Ingredients	Nº1 young animals	Nº2 bulls	Nº3 cows	Compound feed for dairy cows (control)
Herbal flour	15	25	35	-
Corn (grain)	35	42	20	10
Grain waste	-	-	-	20
Safflower meal	11	10	10	8
Sunflower cake	10	9	9	10
Flaxseed cake	10	9	14	-

Cotton meal	6	6	6	4
Wheat bran	15	-	-	54
Tricalcium phosphate	1	1	1	-
Chalk	1	1	1	1
Salt	1	1	1	1
Total:	100	100	100	100

As can be seen from Table 3, the development of a compound feed formulation increases the feed value taking into account the age of the cattle when fed with crude protein. Correctly incorporated into the formulation of crude protein for the age of cattle will provide an energy reserve.

In large quantities, the composition of the compound feed contains products containing the main supply of nutrients - proteins, carbohydrates, etc., in a smaller amount - those components that are rich in some individual nutrients, for example, protein. Their addition increases the total content of these nutrients in the compound feed. In relatively small quantities, products are added consisting of one or several substances in very high concentrations

In this regard, the use of modern enzyme preparations, in our opinion, could better expand the possibilities of poultry farmers to use the products of processing of safflower or soybean meal for feeding birds.

According to the above tables 1, 2, 3, you can see with the addition of safflower cake to the

compound feed from 5 to 15%, which led to an increase in crude protein to 15% and fat in it to

1.5%. The feed value in recipes 1, 2 and 3 was 74, 74 and 72 feed units, respectively.

When safflower meal was added to the compound feed, which differed from the cake by a lower fat content, but increased crude protein (up to 25%), the feed value was 74 and 73 feed units, crude protein up to 15% and fat up to 0.17%.

All recipes contain feed that meets the requirements of GOST. Based on the above, we have developed a recommended technological scheme, in which the feed value and nutritional value of compound feeds is improved by adding safflower cake to their composition.

Next, we granulate the developed recipe. Granulated compound feed occupies an important place in the diet of farm animals. Due to its advantages over conventional ground grain mixture and other types of feed, it is widely used for feeding poultry (chickens, turkeys, geese, ducks), rabbits, cattle and other ungulates, including pigs. In this case, you can ignore the age of the animal.

Advantages of granulated feed:

- Granulation of the grain mixture allows you to maintain the proportion of ingredients, due to which the animal cannot choose individual components of the compound feed and receives a balanced amount of useful trace elements and nutrients;
- Granulated compound feed is universal, well absorbed by all farm animals. The animal does not chew ordinary cereal mixtures well, which can make it difficult to digest and assimilate food (the same applies to mealy feed for ruminants and poultry).
- In the process of granulating compound feed, the grain mixture receives thermal / hydrothermal treatment, which contributes to the death of pathogens, but retains the necessary vitamins and microelements, contributes to better absorption of feed;
- Granulated compound feed is convenient to store and transport.

The technology for the production of granulated compound feed differs significantly depending on the recipe. There are several technological processes for the main stages of compound feed production.

Shredding. At this stage, the components of the future feed are crushed to a certain fraction. Depending on the recipe, after grinding the feed components, the resulting mixture can be sent for sieving and then for re-grinding;

Dosing and mixing. At this stage, the various feed ingredients are precisely dosed and mixed until homogeneous;

Granulation. After mixing, the resulting homogeneous mass enters the pellet press, where it takes the form of granules.

Cooling, sifting. The granulation process is accompanied by high heating of the granules to a temperature of over 100 ° C, therefore, after leaving the feed granulator, they must be cooled to ambient temperature. At the stage of sieving, fractions of the non-granular mixture are separated from the granules.

Packing of finished products. At this stage, the finished granulated feed is packed in bags or big bags.

Compound feed occupies one of the most important places in the diet of farm animals and birds. In this case, it is granulated feed that is most often used, and not loose feed. This is explained by the fact that the feed pelletizing technology allows you to obtain products:

- With an increase in the shelf life (compared with loose);
- Well tolerated during transportation;
- Resistant to external factors (temperature fluctuations, sunlight);
- With a rational consumption (in comparison with the loose, which animals and birds often simply cannot collect from the bottom of the feeders, and part of it remains not eaten).

The advantage of pelleted feed over loose feed is that animals can easily collect spilled pellets from the ground, like loose feed mixed with dust and earth, or blown to the sides by the wind in feeders located in open enclosures.

Also, among the advantages of granulated feed, the following are distinguished:

- all granules contain the same number of components. This means that each animal

will receive all the nutrients it needs with its feed. In the case of feeding loose feed, some animals may choose components that are more attractive to them and not eat others;

- Granulated feed has a long shelf life. Mold inhibitors can be added to it, which will prevent harmful fungi from developing in the feed, and it will remain completely safe for animals throughout the entire shelf life;
- The process of granulating compound feeds provides for thermal treatment of components. High temperature kills harmful microorganisms, including salmonella;
- During transportation, the loss of granulated feed will be lower than that of bulk;
- Feed in granules is more compact than loose
- Compound feeds are granulated in two ways: dry and wet.

In wet granulation, the mixture is first moistened with hot water (65-70-80 °C), due to which the granules are denser and slowly dissolve in water. But due to the need to dry the finished pellets, wet production of feed is delayed and becomes more costly. This method takes advantage of the manufacture of fish feed.

Most often, the granulation of compound feed occurs in a dry way. For this, special presses with rotating dies are used. Before pressing, the mixture is not moistened with water, but steamed, sometimes adding binding components such as fat, hydrol or molasses. Long-term drying of granules after production is not required.

For granulation we use a special device including a granulator, a granule grinder and a cooling column.

The spreading mixture is first fed through a dosing feeder into the mixer, where it is saturated with hot water or some binding liquid through special nozzles, then it is steamed. Then the prepared mixture goes to the pressing part of the device. Pressing is performed using a die with holes of a certain size of two or three rollers. Getting into the gaps between the matrix and the rollers, the mixture is compressed, then passes through the die takes the form of granules. At the exit, the granules are cut with blades (the length of the granules can be adjusted by bringing the knives closer or moving away). Finished granules leave the device hot and can easily crumble, so they immediately enter the cooler. After that, they harden and become ready for packaging or direct use. There is a nuance, the steaming process can be allowed if binders are added. But experiments have proved that the best result (dense granules) is achieved precisely with the symbiosis of steaming and the presence of binders.

The wet granulation system also includes a sieve shaker and an automatic weighing machine. The original feed enters the press with hot water, then the resulting granules are dried (at a temperature of 100 to 110 °C). The process of stska does not take much time, therefore useful substances do not lose their properties. As a result of this process, the size of the granules is also checked, those that do not correspond (small particles passing through sieve holes up to 2.5 mm in size) are returned to the granulation line again. Then the granules are cooled in a column and sorted.

The benefit of pelleted feed for poultry and animals is that each pellet contains in certain proportions all the feed ingredients provided for in the recipe, which allows you to ensure adequate nutrition.

For birds, the parameters have been established that when using pelleted feed, birds use less energy than when using regular feed. It is healthier for birds to consume pellets than liquid or pasty feed because they do not clog the beak.

For animals, conditions have been established, for example, due to the structural features of the chewing apparatus, it is difficult for ruminants to grasp mealy food. This leads to the fact that the chewing apparatus is used incorrectly, and the stomach does not receive food in the form it needs. Granules, having clear forms, get to the animal on the tongue, do not irritate the mucous membrane and are chewed properly, supplying all the necessary elements to the stomach. And also, uneaten residues in the feeders will not deteriorate for some time, therefore, they will not pose a danger to animal health. When feeding on granulated mixed fodders, the productivity of animals and birds increases, the mortality of young animals decreases, the fertility and quality of finished products improve.

CONCLUSIONS

It should be noted that safflower meal is inferior to cotton meal and barley in terms of crude fiber content, so the feed value is reduced to 0.72 feed units. However, the content of crude and digestible protein is almost 2 times higher than that of barley and

the amino acid composition is better than that of cottonseed meal and barley.

At present, intensive work is underway to test cotton and safflower products in animal husbandry, poultry farming and fish farming. Also, the issues of using these formulations for feeding fish and ensuring the successful development of fish farms are discussed. In addition, conditions are being sought for the preparation of unconventional protein-containing products from soybean meal and rice flour for dietary nutrition and as new pharmaceuticals for targeted use. Research is also underway on the use of biological products for pre-sowing treatment of seeds of other plants.

And also, the developed recipe for granulation according to technological parameters will not allow uneaten residues in the feeders to deteriorate, and this means the safe preservation of compound feed will not pose a danger to animal health. When feeding on granular compound feeds, the productivity of animals and birds increases, the mortality of young animals decreases, the fertility and quality of finished products improve.

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