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Providing For Quality Grinding Grain for the Implementation of the Biological Potential of Productive Animals.

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ABSTRACT

This article presents the results of studying the use of a hammer mill to prepare the feed. Data on the fractional composition of crushed grain and its nutritional value. Substantiates the direction of improving the production process of feed.

Keywords: crusher, grinding grain, dairy cattle, fractional composition

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INTRODUCTION

An important role in providing people with quality food plays a steady increase in crop production and livestock production through full and rational use of genetic potential of biological objects. Particularly acute this problem becomes in the production of animal products, cost structure in which the main share allocated feed, produced mainly from crop production. The potential milk production of cows of all breeds Russia is not less than 4500 kg of milk per year. However, the total deviation from the process requirements, including the quality of feeding, leading to the actual realization of the pledged biological potential and productivity of the animals only by 40-60% [1, 11]. As is known, the production of meat, milk, wool, eggs, fish and other animal products should be provided with high-quality feed, balanced on the basic elements of food and essential amino acids. The proportion of feed costs is 50-60% or more [2, 10].

The required components of the diet are cereals animal feed, which are crushed before feeding. As a result of the grinding of feed increases the area of feed particles and it helps to speed up the processes of digestion and increases nutrient availability [3, 5, 8].

Thus, animal feed efficiency depends not only on the balance of the feed composition, but also on the size of its ingredients which are characterized by weight average particle diameter d_{av} (grinding module M). Grinding is thin, if the average particle diameter is in the range of 0,2-1,0 mm average – 1,0-1,8 mm, and large - 1,8-2,6 mm. Preparation of feed necessary grinding depends on the type of animal. The presence in the compound feed a large number of powder fraction reduces its digestibility, and as a consequence, under-use of the biological potential of the animals [4, 6, 9].

The most widely used in production lines for the preparation of feed received hammer crushers. In their process of destruction of grain carried out in cooperation with the working chamber of hammers and sieves. These crushers have a number of advantages, such as simple structure, easy maintenance and repair. However, the quality of the grain milling material is substantially different from the values required grind size and significantly decreases with increasing moisture content of grain.

MATERIALS AND METHODS

To assess the effectiveness of the hammer mills experiment was conducted in a farm-breeding plant «Kazminsky» of Stavropol Territory. At the crusher model KDU-2 were installed new hammers and sieve diameter of 8 mm. Feed intended for feeding dairy cattle. The composition of the feed composed of the following components: 35% barley, 17% oats 24% wheat and 24% of maize. Within 35 days after each workweek was made the selection of batches of grain mixture of crushed mass weighing 5 kg. Weekly grind feed, according to the needs of the farm, the average was 300 tons [7].

Grinding unit determined in accordance with all-Union State Standard 13496.8-72. From a sample of crushed product was selected a sample weight of 100 g is then performed in a laboratory setting its sifting for 5 minutes. On the scales of the brand ALC-1100d2 ground product weighed residues on each sieve up to 0,01 g Processing the results of of sifting allowed us to determine the percentage distribution of the particle fractions and the average particle diameter d_{av}. Additionally, in the course of the experiment was carried out quantitative estimation of the content of wear products in the working bodies of the crusher feed. For this refined mass was weighed portions of the selected magnetic treatment. When coarse average particle diameter should be in the range 1,8-2,6 mm, which corresponds to the residue in sieve having meshes of 1 mm and 2 mm. It is assumed that a particle diameter of less than 1 mm is excessively thin grinding, but more than 3 mm is insufficient grinding feed mixture respectively.

RESULTS AND DISCUSSION

The results showed that the excessively thin grinding averaged 34% with 18-24% of the particle size is less than 0,5 mm including less than 0,25 mm - 7-11%, which are close in size to powder.

The average particle size in the first period of operation of the crusher was 1,72 mm. This value is below the lower limit coarse (M = 1,8-2,6), i.e. the resulting crushed grain containing a large amount of fine particles. Since then, the grinding operation of the crusher unit conform to the required values, and the

tendency to increase particle size in the crushed material. Thus, if in the beginning of the experiment portion of excessively thin grinding was 42,4% and 15,2% insufficient grinding, at the end of observation 26,2% and 26,8%, respectively. This trend is the distribution of the particle fractions is due to wear of hammers and sieves Crushers. Also, the figure shows that with the passage of time the number of metal particles in the feed decreased. In the initial period of operation of the crusher their weight was 29 mg per 1 kg of particulate product which is less than the limit of 1 mg. After observing the content of metallic impurities not exceeding 8 mg per 1 kg of feed. In general, for the whole period of operation of the crusher was ground in 1500 tonne of product, and the hammers lost an average of 4,5 kg initial weight of 24,7 kg.

It should be noted that during the period of the experiment, the number of ground mass corresponding required values grind size not greater than 47%. Thus, although the average particle size and was within a predetermined range, but in fact only half of the prepared feed corresponded zootechnical requirements.

To evaluate the inadmissibility of these losses in the form of excessively thin grinding, studies have been conducted in grain quality testing laboratory of the Stavropol branch of «Federal center for evaluation of safety and quality of grain and its products».

For the experimental analysis of two samples were selected: whole grains of wheat and excessively grinding sample is grain from this wheat is smaller than 0.5 mm. Each sample was 2 kg. Humidity is between 15% and slightly decreased after grinding. So for the whole wheat it is equal to 10.8%, while it was 10.4% for excessively thin grinding, due to interaction with the working bodies of grain harvester. The ash content of whole grains is within the accepted norms of 1.44 - 2.10% and amounts to 1.73%, indicating that the good quality of the test products. Ash content of excessively thin grinding was 2.53%, which is 1,5 times greater than that of whole grains (Figure).

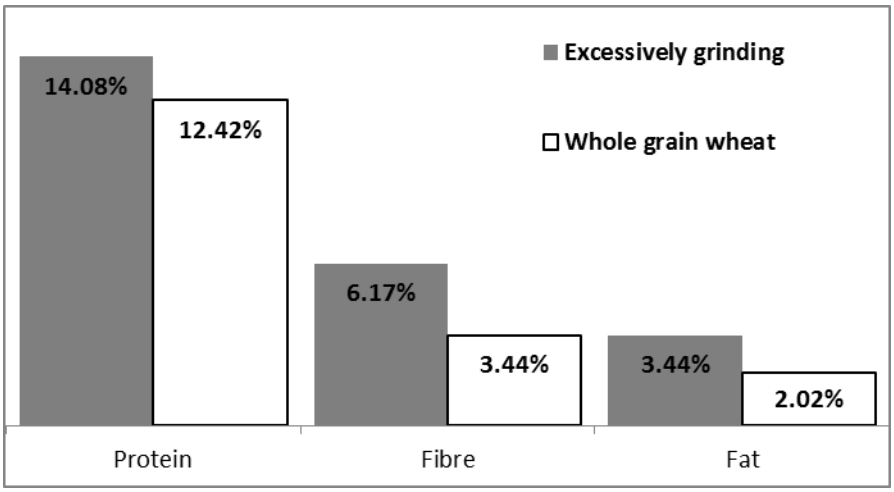

Figure: Comparative data of nutrients in the different fractions of wheat

The figure shows that the mass fraction of protein in whole grains is equal to 12,42% and 14,08% in the excessively grinding grain that 18,8% percent more. The amount of fiber in grains of 3,44% and 6.17% in the excessively grinding grain, which is 44% higher than the original. The fat content of whole grains of wheat was 2,02%, at 42% higher in the excessively grinding grain, and reached 3,44%. Studies have shown that excessively grinding grain in terms of nutritional value is not only not inferior to whole wheat, but also contains a significantly greater amount of nutrients. Therefore, in actual production conditions significantly increases the need to maintain excessively grinding grain consisting essentially of powder. But on the other hand, animal feeding increased amounts of finely ground grain material negative effect on their health. For example the lack of dietary fiber in cattle is one of the causes of acidosis, and an overabundance of nutrients and feeding birds milled leads to various forms of vitamin deficiency. Thus, only the feed control of particle size may provide a complete diet animals in accordance with agricultural standards.

Since the excessively grinding grain is made up of tiny particles impossible to trace its losses into the environment, settling in the working bodies and other losses, and it can not be fed to animals due to non-compliance with the particle size. So actually excessively grinding grain equivalent to manufacturing defects, unsuitable for further use in this form, or require additional costs for the change of its status due to the binding between a powder particle.

CONCLUSION

Reducing excessively grinding grain and reduction of powder to a minimum is one of the most important scientific and practical problems in the process of grinding of feed materials. The studies have shown the feasibility and the need to further improve the production process grinding and modernization of existing structures crushers, to provide high-quality animal feed concentrated.

REFERENCES

[1] Lebedev A.T. Resource ways to improve the reliability and efficiency of technological processes in the agricultural sector: monograph. Stavropol 2012:376 p.
[2] Anatoli Georgievich Molchanov, Valeriy Georgievich Zhdanov, Aleksandr Valentinovich Ivashina, Alexey Valerevich Efanov, Sergei Nikolayevich Shlykov and Ruslan Saferbegovich Omarov. Res J Pharm Biol Chem Sci 2015;6(6):633-637.
[3] Vladimir Vsevolodovich Sadovoy, Viktor Ivanovich Guzenko, Sergei Nikolayevich Shlykov, Ruslan Saferbegovich Omarov and Tatiana Viktorovna Shchedrina. Res J Pharm Biol Chem Sci 2015;6(6):613-616.
[4] Ivan Vyacheslavovich Atanov, Vladimir Yakovlevich Khorol'skiy, Elena Anatolievna Logacheva, Sergey Nikolaevich Antonov and Ruslan Saferbegovich Omarov. Res J Pharm Biol Chem Sci 2015;6(6):671-676.
[5] Anton Alekseyevich Nesterenko, Nadezhda Viktorovna Kenijz and Sergei Nikolayevich Shlykov. Res J Pharm Biol Chem Sci 2016;7(1):1214 -1220.
[6] Vladimir Ivanovich Trukhachev, Nikolai Zakharovich Zlydnev, Nikolai Viktorovich Samokish. Res J Pharm Biol Chem Sci 2015;6(6):1321-1327.
[7] Vladimir Ivanovich Trukhachev, Galina Petrovna Starodubtseva, Olga Vladimirovna Sycheva, Svetlana Ivanovna Lubaya, and Marina Vladimirovna Veselova. Res J Pharm Biol Chem Sci 2015;6(4):990-995.
[8] Vladimir Ivanovich Trukhachev, Nikolai Zakharovich Zlydnev,Sergei Alexandrovich Oleynik, and Vitaly Yuryvich Morozov. Res J Pharm Biol Chem Sci 2015;6(6):613-616.
[9] Vladimir Ivanovich Trukhachev, Nikolai Zakharovich Zlydnev,Sergei Alexandrovich Oleynik, and Vitaly Yuryvich Morozov. Res J Pharm Biol Chem Sci 2015;6(6):1314-1316.