

RESEARCH OF TECHNOLOGICAL EFFICIENCY OF HARBEL PEELING AND ITS INFLUENCE QUALITY OF FOOD

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Abstract

Experimental data by definition of technological efficiency clearing and offered peeling machinery for peeling of the grain of barley, the maintenance of beaten grains before and after peeling, quality indicators of mixed fodders have resulted. Thus, after application offered peeling machinery the quantity of the whole kernel increases to 8%, beaten grain decreases by 3%, and cellulose for 3.5% and by that leads to forage mastering, improvement of the digestion of animals and quality indicators of mixed sats.

Keywords: barley, flaking, fiber, forage, quality.

Introduction

In the current conditions, our country is taking measures to save and increase grain, energy and other material resources, as well as increasing the use of local raw materials and improving the quality of the finished product [1].

In the country from year to year, the need for production of combined feed is growing, their range is expanding.

Modern animal breeds require fodder that fully meets their nutritional needs to sustain life, development, reproduction, and high productivity. Feeding is the main factor influencing the quantitative and high-quality side of metabolism in the animal. Lack or excess in the feed of essential nutrients changes the course of biochemical processes in the body, reduces productivity, and can even be the cause of diseases.

The scientifically-based need of the animal for nutrients acts in turn as a requirement to the nutritional value of feed and their daily allowance.

Obtaining high-quality compound feed implies, first of all, the presence of the optimal calculation of compound feed in the form of its recipe, which provides all the required

nutritional indicators and biologically active substances. To implement the best calculation in real feed at the enterprise, it is necessary to have high-quality components, modern technological equipment for their preparation, accurate dosing, and uniform mixing [2].

Currently, the problem of improving the quality of finished products is considered as one of the main in improving the efficiency of industrial and private production of animal feed. The task is to involve in the sphere of production not only agricultural raw materials processed at enterprises, but also prepared raw materials. Their use allows you to expand the range of food, technical and feed products, create additional sources of raw materials and fuel, reduce the area under crops of industrial crops [3]. The most important characteristic of compound feed is quality indicators and nutritional value. The feed unit is equivalent to the nutritional value of 1 kg of oats with a bulk density of 450-480 gr/l at a moisture content of 13% as a unit of the nutritional value of feed. For the convenience of calculations, the nutritional value of feed is often expressed by the number of feed units containing 100 kg of feed.

Peeling grain, i.e. the separation of the outer shells (flowering in barley, oats) is one of the main operations in the technology of animal feed production. The perfection of this operation to a large extent determines the yield and quality of the finished product. The choice of peeling methods depends on the anatomical structure of the grain, namely: the bond strength of the shells with the core, the strength of the core, the range of products produced. Depending on these factors, the most appropriate impact of the working bodies is determined, which ensures separation of the shells with the smallest crushing of the core, as well as with the least energy consumption.

In feed production, film grain crops are flaked in the case of the production of certain types of feed. In connection with the need to peel the grain of various crops in feed production, it is desirable to have universal machines capable of effectively peeling grain with various anatomical structures. The peeling process should provide, possibly, a more complete separation of the shells of the grains received in the peeling machine.

Barley is a biologically valuable and easily digestible feed for all types of animals, the protein content in it is 8-14%. In the composition of compound feeds for young animals and poultry, barley (separated from the film) is introduced in an amount of 10-25%, 25-60% of the mass of feed in the diet of cattle [4-6].

1 kg of barley grain contains 100 g of digestible protein and 1.28 kg units, which is more than the grain of oats and rye. A small amount of barley in the compound feed helps to strengthen the health and stamina of cattle during the stall period.

Materials and Methods

The work used barley grown in Uzbekistan.

Quantitatively, the peeling efficiency can be estimated by the so-called peeling coefficient (%) [7].

$$K_{\text{peeling}} = (N_1 - N_2) / N_1 \times 100\%$$

where, N1 is the content of unpeeled grains in the product entering the machine, %; N2 is the content of unpeeled grains in the product exiting the machine, %.

Results and Discussions

After studying the qualitative and physical-chemical parameters of barley, we examined the effectiveness of peeling, the quality of the produced feed before and after the peeling of barley grain. The technological efficiency of peeling and the content of broken grain of barley in the control scouring machines and the proposed peeling machine were determined. The following are data on certain indicators (Table 1).

Table 1 Comparative technological efficiency of a scouring and experimental peeling machine

Grain culture and equipment	Product	Composition, % to the total					Percentage, %		
		Grain unpeeled	The core is whole	The core is crushed	flour	Luzga and impurities	Peeling	Core integrity	Technological efficiency
Barley (processing in p3-BGO wallpaper machines)	Until 1st peeling	99,4	0,09	0,5	-	-	-	-	-
	After the 1st peeling	14,75	56,0	5,9	0,86	22,5	85,1	90,0	87,5
Barley (processing in an experimental flaky machine)	Until 1st peeling	99,4	0,09	0,4	-	-	-	-	-
	After the 1st peeling	11,6	64,3	3,6	1,5	19,0	88,3	93,1	90,7
Difference	Until 1st peeling	-	-	0,1	-	-	-	-	-
Efficiency	After the 1st peeling	3,15	8,3	2,3	0,64	3,5	3,2	3,10	3,2

Analyzing the data table. 1 we can conclude that the proposed method of peeling gives a positive effect in terms of peeling up to 3.2%. [8-10].

The use of this method of peeling allowed to improve the technology of preparation and development of high-quality finished products.

One indicator of the effectiveness of the peeling process in a peeling machine is the content of broken and peeled barley grain. The following is the content of broken grain before and after peeling in a scrubbing and experimental peeling machine (Table 2).

Table 2 The content of broken grain before and after processing in the washing and experimental peeling machine

Sample characteristics	Number of broken grains, % to the mass of barley grain		
	Before processing	After processing	Increase
Control	0,5	0,5	-
Sfoliating in wallpaper	0,5	5,9	5,4
The husks in the experimental machine	0,5	3,6	3,1

As can be seen from the table. 2 the number of broken grains in washing machines is greater than in our experimental machine and the increase is 1.7%.

The physical-mechanical properties of husked and unpeeled barley grains processed in scouring machines and an experimental machine are presented below (Table 3).

Table 3 Physical-mechanical properties before and after flaking barley grains

Culture and product	Dimensions, mm			Volume mass, gr/l	Density 3 gr/cm	Mass of 1000 grains, g	Soaring speed, m/s
	Length	Width	Thickness				
Barley (unshelled grain)	8,7	4,3	3,8	610	1,4	47,0	9,3
Barley (husk in wallpaper machines)	8,3	3,8	3,2	658	1,5 2	40,0	7,5
Barley (husk in experimental machine)	8,4	3,8	3,3	665	1,51	41,0	7,6

As shown by studies of the physical-mechanical properties of the treated barley, the size, weight of 1000 grains, the speed of grain flowing decrease, and other physical properties (bulk mass, density) increase [11-13]. The following are the main chemical and nutritional indicators of the control and experimental recipes with the addition of husked and unhelled barley grains (Table 4).

Table 4 The chemical composition of the control and received feed mixture, %

Indicators	Control, %	Experienced recipes, %		
		1 (3 %)	2 (5 %)	3 (8 %)
K/E on100 кг	76	74	75	71
Humidity, %	10,5	10,8	11.0/10.6	9,8
Raw protein, %	12,0	13,5	14.5/14.4	13,0
Rawfiber, %	13	12,8	13.5/10.0	14,0
Dry substances, %	89,5	89,2	89.0/89.4	90,2
Calcium (Са), %	0,8	0,82	0.96/0,95	0,84
Phosphorus (R), %	0,8	0,79	0.84/0,84	0,77
Sodium (Na), %	0,1	0,1	0.08/0.079	0,08

** When adding shelled barley

Analyzing the experimental data from the table. 4 when adding shelled barley grain using 5% feed flour, fiber decreased to 3.5%, and mineral elements from 0.01 to 0.02%. According to available literature data, each decrease in fiber by 1% increases the digestibility and nutritional value of animal feed by 1.7-1.9%, thereby reducing the consumption of animal feed [10-15].

Conclusion

Thus, it was found that the peeling of barley grain in the experimental peeling machine we offer helps to reduce broken grain to 2%, the mass fraction of fiber in mixed feeds to 3.5%, and thereby leads to improved assimilation of feeds and quality indicators of mixed feeds. Based on the research, we developed a technological scheme and improved the technology for producing compound feeds using unconventional raw materials and the proposed peeling machine.

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