

## ANALYSIS OF THE NUTRITIONAL PROPERTIES OF CORN COBS FOR FEED PRODUCTION

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*At the present time, the enrichment and distribution of the content of fodder rations looks like an urgent task for fodder producers who provide livestock with quality products necessary for the development of this sector of the agro-industrial complex. The use of components in the composition of fodder that, without deterioration of the quality indicators of finished products with a simultaneous decrease in price, will lead to the provision of a fodder base on the consumption market, which in turn contributes to the conditions under which the use of such products makes possible the implementation of the program for increasing the productivity of livestock sector of the economy. One of these components for filling feed is the use of corn stalks, which must first be processed to certain sizes, taking into account the age of the animals, the production purpose and their species. Currently, the introduction of processed corn cobs involves the preliminary preparation of raw materials, which involves grinding the whole or pre-crushed cob, their conservation, which involves the implementation of technologically necessary operations for the preparation of raw materials, as well as the production of a mixture of grain and crushed cobs, then it is necessary to understand the nutritional value of the component made from the cob of corn.*

**Key words:** *fodder, analysis, use, composition, corn.*

**Formulation of the problem.** At this time, taking into account their nutritional properties of corn, the use of corn stalks in the manufacture of fodder is mainly in two directions:

- preservation of whole or crushed cobs, which includes several methods (drying, ensiling, chemical preservation, ventilation with natural or artificially cooled air, and others);
- preparation of crushed grain-stem mixture (ZSS) from pre-threshed cobs

To preserve corn cobs, it is harvested with corn harvesters at a moisture content of 40...45%. Then the cobs as a whole or crushed on stationary shredders are loaded into the storage, compacted and hermetically covered. The most attractive option for preserving cobs is considered to be laying them in a trench or tower in a chopped form. At the same time, the size of the crushed particles should be within 3...4 mm and they should be at least 70% with the mandatory absence of whole grains.

**Analysis of recent research and publications.** When harvesting a corn grain-cob mixture with different ratios of grain and cobs, corn is harvested with harvesters and threshed cobs with a moisture content of 35...40% in the stage of waxy ripeness, after

which the mixture is crushed on crushers, and the resulting mass is ensiled in ground or tower storages. In contrast to the technology of ensiling crushed corn cobs, only part of the cobs (approximately 40...80% of the mass in cobs) is used together with the grain when preparing the grain-cob mixture. The necessary level of fiber in canned feed is achieved by adjusting the working organs of harvesters during harvesting or by sifting out large particles during feeding. For feeding pigs, this level is 5...7%, and for cattle - 10...12%. Nutrient substances contained in ZSS are preserved by bacterial hydrolysis of sugars with the formation of organic acids and sugars [1, 4]. The technology of harvesting ZSS with a different ratio of grain and cobs received the name grain-cob mix (from English CCM - Coph Cob Mix, which in translation means grain-cob mixture). Researches [2, 3] have established that the productive effect of the ZSS is at the level of concentrated fodder made from dried grain. An important condition for obtaining high-quality fodder is the grinding of the SCC to a certain granulometric composition. In experimental researches [4,5], feeds using ZSS of different degrees of crushing with a crushing module of 5...6 (coarse grinding) and 2 (fine grinding) were placed in two concrete containers for storage. Comparing the content of nutrients in other components in the phase of full ripeness, we can conclude that in terms of protein, protein and fat content, the rods are significantly inferior to the stalks and husks of the cobs, the fiber content is at the same level, but they contain more extractive substances that do not contain nitrogen, and 4.3...4.9 times less ash. In a number of works [2,3,5], the general chemical composition of corn stalks is also given and it is indicated that in terms of fodder units (from 0.2 to 0.4 fodder units in 1 kg) they are superior to straw of good quality. For a more complete comparative analysis of the chemical composition of corn stalks, the data of works [2,3,4,5] were analyzed, as a result of which it was established (Table 1) that in the phase of full ripeness, the stalks contain a little more starch than the wrappers, but significantly less than a grain. In terms of the content of water-soluble carbohydrates, they exceed grain several times.

**Table 1. The content of starch and dissolved carbohydrates in separate sections of the corn cob by the degree of ripeness (in % of the calculation of absolutely dry matter).**

Constituents particles	Degree of ripeness					
	starch			water-soluble carbohydrates		
	dairy	waxy	full	dairy	waxy	full
grain	41,80	65,20	72,30	7,58	1,52	0,56
rod	-	7,50	3,74	8,93	1,62	1,84
covers	6,78	3,72	3,71	16,37	2,70	1,49

**The purpose of the article.** Analysis of the nutritional components of corn cob components for use as feed additives in their production.

**Presenting main material.** The analysis of the nutritional components of the components of the corn cob for use depends not only on natural indicators, but also changes during storage. After 150 days of storage, it was determined that the quality of coarse grinding was lower than that of fine grinding because it contained less acid

and more alcohol with higher losses of dry matter. The content of sugars in their composition in different fractions is not the same, as shown in the data of the table. 2  
**Table 2. The content of sugars in different fractions of the core of the corn cob (in mg per 1 kg of dry matter).**

part of the rod	monosaccharides	disaccharides		all sugars
		everything	including sucrose	
upper	2,0	2,9	0,9	4,9
average	1,4	0,8	0,0	2,2
basis	1,6	1,3	0,0	2,9

It was also established that in all phases of ripeness, the rods contain a significant amount of free fatty acids, while the acid number of fat is 43.92 for the grain and the rod at the milky, waxy, and full phases of ripeness, respectively; 10.24; 8.94 and 120.7; 76.06; 47.12 mg of KOH per 1 g. Thus, the analysis of the conducted studies on the composition of the rods and its comparison with other components of the corn plant allows us to draw a conclusion about the feasibility of using the rods in the production of fodder. Research has established that during storage in conditions of a gradual decrease in the relative humidity of the air, there is a change in the moisture ratio of the grain and the stem in the cob. Depending on the drying of the cob, the position gradually changes and at the humidity of the cob, at the level of 16.7%, the moisture content of the grain  $W$  and the rod become are the same, and then  $W$  of the rod becomes smaller. Research has also established that not only the core as a whole is specific in terms of its own water absorption properties, but also its different parts differ significantly in terms of moisture, both from each other and from the grain of corn (Table 3). Taking into account that the rods before grinding are usually subject to a certain storage time, as well as the fact that their strength properties largely depend on humidity, based on the data in the table. 3 When conducting experimental studies, the range of its change within 8...20% was chosen.

**Table 3. Changes in the equilibrium humidity of the rod, its parts and grain at different relative air humidity.**

Relative humidity, %	Equilibrium moisture, %				
	rod as a whole	top rod	basis rod	middle rod	grain
20	7,21	7,30	7,23	7,20	8,08
40	7,74	8,58	7,74	7,64	9,15
60	9,76	10,49	9,76	9,69	11,75
80	14,08	14,83	14,83	13,89	15,51
100	29,02	33,38	30,21	28,33	25,13

**Conclusions.** Thus, the performed analysis of some nutritional indicators of corn cobs and comparison with parts of the plant allow to draw a conclusion about the expediency of using corn cobs as an additional component and their introduction into animal feed during their production.

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### **АНАЛІЗ ХАРЧОВИХ ВЛАСТИВОСТЕЙ СТРИЖНІВ КУКУРУДЗИ ДЛЯ ВИРОБНИЦТВА КОРМІВ**

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*У теперішній час збагачення та поширення змісту раціонів кормів виглядає як актуальне завдання для виробників кормів, які забезпечують тваринництво необхідною для розвитку цього сектору АПК, якісною продукцією. Використання у складі кормів компонентів які без погіршення якісних показників готової продукції з одночасним здешевленням буде призводити для забезпечення кормовою базою на ринку споживання, що у свою чергу сприяє умовам при яких використання такої продукції становить можливим реалізацію програми підвищення продуктивності тваринницького сектору економіки. Одним з таких компонентів для наповнення кормів є використання стрижнів кукурудзи, які попередньо мають бути оброблені до певних розмірів, з врахуванням віку тварин, виробничого призначення та їх виду. У теперішній час впровадження перероблених стрижнів кукурудзи передбачає попередню підготовку сировини яка передбачає подрібнення цілого або попередньо здрібненого стрижня, їх консервація, яка передбачає реалізацію технологічно необхідних операцій з підготовки сировини, а також виготовлення суміші з зерна та подрібнених стрижнів, тоді необхідним є розуміння харчової значності компоненту виготовленого з стрижню кукурудзи*

**Ключові слова:** корм, аналіз, використання, склад, кукурудза.