UDC 636.085.55:633.25:636.5
DOI https://doi.org/10.15673/gpmf.v25i1.3078

N. Vorona, PhD. of Technical Science, Associate Professor, *E-mail: tarnin@te.net.ua*
ORCID: https://orcid.org/0000-0001-6903-9016, Researcher ID: F-8020-2016, Scopus ID: 57188205800
B. Iegorov, Doctor of Technical Sciences, Professor, *E-mail:bogdanegoroff58@gmail.com,*
ScopusID: 565788026001, ORCID: 0000- 0001-7526-0315, ResearcherID: Q-1365-2015
A. Makarynska, Doctor of Technical Science, Associate Professor, *E-mail: allavm2015@gmail.com*
ORCID: https://orcid.org/0000-0003-1879-8455, Researcher ID: C-5217-2016, Scopus ID: 57192819060
A. Lapinska, PhD. of Technical Science, Associate Professor, *E-mail: alocnka.onaft@gmail.com*
O. Khodakivskyi, Master of ONUT, *E-mail: jur_@ukr.net*
Scopus ID 57223318327, ORCID 0000-0003-4217-2516, Researcher ID: B-6483-2016
Department of technology grain and Feed, Tel. +38048 7124013
Odesa National University of Technology, 112, Kanatna Str., Odesa, 65039, Ukraine

PROSPECTS FOR THE USE OF AMARANTH AND ITS PROCESSING PRODUCTS IN THE COMPOSITION OF COMPOUND FEED FOR POULTRY

Abstract

It has been established that the efficiency of livestock farming largely depends on the quality of compound feeds, as they account for up to 70% of the production cost structure. The primary raw material sources for compound feeds include grains, legumes, oilseeds, and their by-products (meal and cake). Yield instability, dependence on weather conditions, fluctuations in agricultural product prices, and increasing competition in the raw material market complicate the ability of compound feed enterprises to secure the necessary resources. The positive dynamics of global compound feed production volumes from 2018 to 2023 are presented. Changes in the volumes of compound feed production in Ukraine from 2019 to 2023 have been summarized. It has been proven that the state of the compound feed industry in Ukraine has undergone significant changes due to the impact of military actions, economic challenges, and disrupted logistics chains during the war. The main trends identified include a reduction in production, increased production costs, and a decline in product quality. An analysis of the distribution of compound feed production volumes in Ukraine in 2023 by types of agricultural animals and poultry shows that the largest share is occupied by the production of compound feed for poultry. This is due to the efficiency of poultry farming, industrialization of production, and accessibility of technologies. It has been proven that global grain reserves have significantly declined over the past 10 years, reaching their lowest level during this period. The dependence of domestic feed production on grain crops results in high sensitivity of livestock, poultry, and aquaculture sectors to factors such as weather conditions, crop yields, economic interests in land use, food market dynamics, and the country's import policies. This issue is further exacerbated by the challenge of protein supply for livestock farming. It has been demonstrated that amaranth can partially address the protein supply issue and reduce dependence on grains in poultry feed production. In the compound feed industry, the use of amaranth seeds is justified by their high protein, amino acid, trace element, and biologically active compound content. In Ukraine, amaranth is actively processed for various industries, with oil being the most common product. It has been established that the cost of amaranth may be higher than traditional components, limiting its use in budget feeds. The market price ranges from 20,000 to 25,000 UAH/ton. The feasibility of using amaranth cake in compound feeds has been substantiated. Amaranth cake is a by-product obtained after pressing oil from amaranth seeds. It is used in compound feed production, improving animal immunity and ensuring better nutrient absorption. Amaranth cake significantly surpasses traditional grains in nutritional value. Its use reduces dependence on other protein components and enables the creation of next-generation compound feeds.

Key words: amaranth, amaranth meal, world volumes of compound feed production, poultry, world grain reserves.

Introduction

Food security is a key element of economic stability and national security for any state. One of the main aspects of ensuring it is the availability of quality food products for the population. In this context, the compound feed industry plays a crucial role as an essential link in the production chain that includes raw material supply, processing, consumption, and providing livestock with the necessary inputs for producing food products [1].

The efficiency of livestock farming largely depends on the quality of compound feeds, which account for up to 70% of the production cost structure. At present, the compound feed industry faces numerous challenges, among which one of the most significant is the issue of ensuring the availability of high-quality raw materials for production. The primary sources of raw materials for compound feeds include grains, legumes, oilseeds, and their by-products (meal and cake). Yield instability, dependence on weather conditions, price fluctuations for agricultural products, and increasing competition in the raw material market complicate the ability of feed enterprises to secure the necessary resources.

The issue of replacing imported components in compound feed formulas with more accessible domestic alternatives that ensure the required nutritional and biological value is particularly acute. At the same time, there is growing demand for eco-friendly and safe feeds, prompting manufacturers to seek new raw material sources and implement innovative technologies.

The war in Ukraine has significantly impacted the compound feed industry by disrupting logistics chains, destroying agricultural infrastructure, causing raw material shortages, and increasing costs. The war has posed challenges to the industry, forcing producers to seek new solutions to sustain production, adapt to new

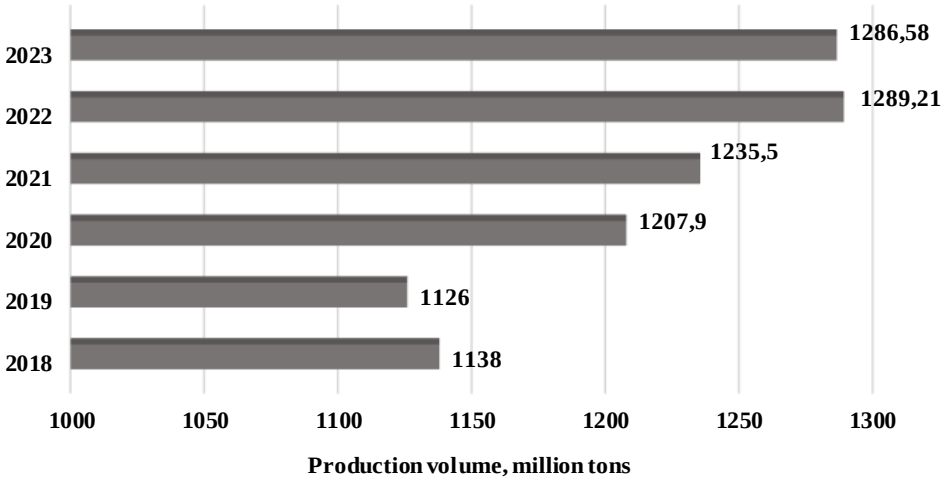

Fig. 1. Changes in the volume of global production of compound feed from 2018 to 2023

conditions, and meet domestic market needs. These changes will have long-term consequences for the compound feed industry in Ukraine.

Research in the compound feed sector is focused on developing effective solutions for securing high-quality raw materials, optimizing feed formulas, and reducing dependence on external markets. This has not only economic but also strategic significance for the sustainable development of agriculture and the food security of the country [2].

Today, many countries worldwide face the pressing issue of producing competitive, environmentally safe, and economically viable livestock products. One traditional method of increasing the productivity of farm animals has been the use of antibiotics as growth promoters (AGPs). However, this approach has significant drawbacks.

The use of antibiotics in animal feed leads to the accumulation of residues in food products, the formation of antibiotic-resistant microflora, which reduces the effectiveness of drugs in veterinary and human medicine. Additionally, such drugs disrupt the microbial balance in animals' digestive systems, negatively affecting their health. For these reasons, many countries, particularly in Europe, have implemented bans on the use of antibiotics as growth promoters in livestock farming.

Such bans encourage the search for alternative methods of enhancing productivity, including the use of probiotics, enzymes, plant-based additives, and the optimization of feeding rations. These approaches aim to preserve the ecological purity of products and reduce the negative impact on the environment [3].

Amaranth is a promising plant increasingly used in the compound feed industry due to its high nutritional value and biologically active compounds. The unique properties of amaranth make it a viable substitute for antibiotics in animal feed production, which is crucial in light of the ban on antibiotic growth promoters in many countries worldwide [4].

In the modern era of developing market relations in Ukraine, where the influence of European integration processes is growing, enterprises face significant risks and uncertainty regarding their operating conditions. Dependence on the marketing environment is increasing, and competition for product markets is intensifying. Under these circumstances, the issue of ensuring the competitiveness of enterprises becomes particularly important.

To ensure competitiveness in the poultry industry, it is necessary to analyze the trends in its development in Ukraine and identify the key factors influencing this process under current conditions [5].

Purpose and objectives of the analysis

The purpose of the study is to justify the feasibility of using amaranth and its processing products as part of compound feed for agricultural poultry to solve the protein problem and reduce dependence on grains in feed production.

Results of the study and their discussion

The relevance of studying the compound feed market is driven by the fact that this industry combines the development of two key areas of the agro-industrial complex: crop production and animal husbandry. It ensures their synergy to meet the population's food needs. However, the modern compound feed market faces several challenges, among which insufficient awareness of consumers and producers stands out. This often leads to the emergence of low-quality products on the market, which can negatively affect animal health and the quality of end products for consumers [1].

Based on data from the annual reports of Alltech Agri-Food Outlook [6], the global production volumes of compound feed for the period from 2018 to 2023 were summarized (Fig. 1). In 2019, a decline in production volumes was observed due to the COVID-19 pandemic.

This global crisis impacted all industries and aspects of life, including society, the economy, political processes, medicine, and technological development.

The COVID-19 pandemic posed a significant challenge to the global community, with its effects expected to persist for a long time after the crisis ends. At the same time, starting in 2020, a gradual recovery of the industry has been noted. From 2020 to 2022, global compound feed production demonstrated rapid growth due to adaptation to new conditions and the recovery of economic activity. In 2023, production decreased by 0.2%. This trend is associated with the increased efficiency of feed use, which allows for reduced consumption to achieve the same levels of animal protein production. Overall, over the past decade, global compound feed production has grown at an average annual rate of 3.7%.

According to the annual reports of Alltech Agri-Food Outlook [6], we have summarized the changes in the volume of feed production in Ukraine from 2019 to 2023 (Fig. 2).

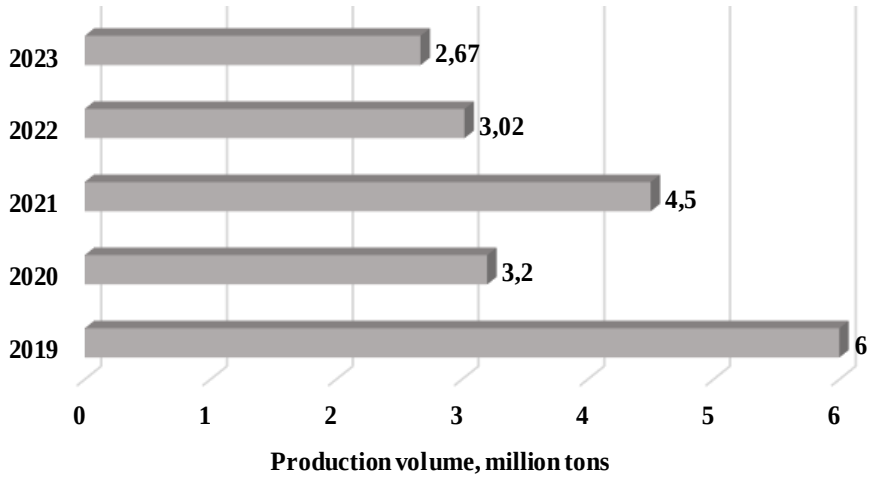

Fig. 2. Changes in compound feed production volumes in Ukraine from 2019 to 2023

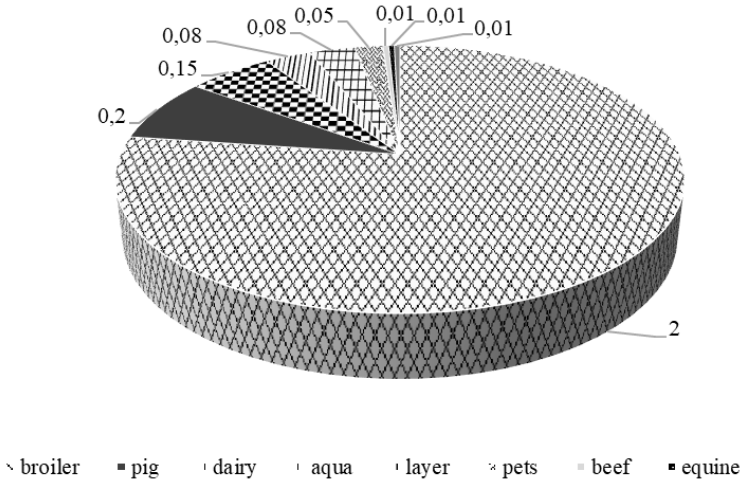

Fig. 3. Distribution of compound feed production volumes in 2023 by types of agricultural animals and poultry, million tons [6]

The compound feed industry in Ukraine has been affected not only by the pandemic but also by the full-scale war that began on February 24, 2022. The state of the compound feed industry in Ukraine under wartime conditions has undergone significant changes due to the impact of military actions, economic challenges, and disrupted logistics chains. The main challenges and trends can be outlined as follows:

1. **Reduction in production.** Due to military operations in key agricultural regions, a significant number of enterprises have been halted or destroyed. Many feed mills and grain storage facilities were damaged or fell into high-risk zones, losing access to raw materials. Disruptions in the supply of grains and oilseeds, which are the main components of compound feeds, as well as soybean meal, fish meal, and other feed components, have significantly impacted production volumes [7].

2. **Increase in production costs.** Rising prices for raw materials and fuel have led to an increase in the cost of compound feeds. This complicates the supply of affordable feed to livestock farms, affecting the entire agro-industrial sector.

3. **Logistical difficulties.** Blocked ports, destroyed transportation routes, and challenges in moving goods within the country have affected the availability of raw materials and compound feeds for both domestic markets and exports.

4. **Decline in product quality.** Due to shortages of certain ingredients, many producers have been forced to lower the quality of compound feeds, which can negatively impact animal productivity. The protein content in feeds often does not meet international standards, making Ukrainian products less competitive on the global market.

Despite the challenges, the industry demonstrates resilience and strives to adapt to new conditions. The role of innovative technologies aimed at optimizing production and finding alternative raw material sources is increasing. A key task is the restoration of destroyed infrastructure and the establishment of new logistical routes [8].

Compound feed producers have begun to use more locally available components, such as sunflower meal or amaranth, instead of traditional soybean meal. Road and rail transport to European countries is increasingly being used as an alternative to maritime routes. The Ukrainian government and international organizations are implementing support programs for the agricultural sector, including loans, grants, and assistance with product exports, which partially contributes to the stabilization of compound feed production.

A market analysis of Ukraine's compound feed industry involves determining the production volumes of compound feed in 2023 by types of agricultural animals and poultry (Fig. 3).

The largest share is occupied by the production of compound feed for agricultural poultry. This trend has persisted for many years due to:

- The significant share of poultry farming in the agricultural sector;
- The high efficiency of poultry production (characterized by a low feed conversion ratio);
- The development of vertically integrated agroholdings involved in both poultry farming and compound feed production;
- High demand for poultry products due to their lower cost compared to other livestock products;
- The technological adaptability of poultry feed.

Poultry farming in Ukraine has shown a stable growth trend, resulting in high demand for poultry feed. Due to the efficiency of poultry farming, industrialization of production, and availability of technologies, poultry feed occupies a leading share in the structure of the country's compound feed industry.

Over the past decade, global grain reserves have significantly declined, reaching their lowest level during this period. In the 2024–2025 marketing year, residual global grain stocks are estimated by the International

Grains Council (IGC) to be approximately 576 million tons, which is 12 million tons less than the previous year and 3.5% lower on a year-over-year basis. This reflects a continuing decline caused by consumption exceeding production, particularly in the wheat and corn segments [9, 10].

The main reasons for the reduction in reserves are:

1. Climate change – droughts and other extreme weather events in key regions.

2. Geopolitical factors – the war in Ukraine, which has significantly reduced export capabilities, especially for wheat and barley.

3. Rising demand – population growth and increased grain use in food, feed, and industrial sectors.

The dependence of domestic feed production on grain crops results in high sensitivity of livestock, poultry, and fish farms to factors such as weather conditions, crop yields, economic interests in land use, food market dynamics, and the country's import policies. Adding to this issue is the acute problem of protein supply in animal husbandry. This situation has led to a reduction in agricultural livestock populations and the emergence of surplus processing capacities in the grain industry.

A key task for improving the efficiency of modern feed production is the introduction of alternative ingredients and technologies with a zero-waste production cycle. This involves more active use of secondary resources and waste in the economic process, which helps reduce dependence on grains and optimize costs. Such an approach contributes to increasing the competitiveness of the feed industry and ensuring environmental sustainability [11].

Amaranth can partially address the protein supply issue and reduce dependence on grains in poultry feed production. However, for maximum effectiveness, the adaptation of production technologies and an assessment of economic feasibility are necessary. The integration of amaranth not only promotes the sustainable development of poultry farming but also mitigates the impact on food security under resource-constrained conditions.

Amaranth is currently considered one of the most profitable agricultural crops in Ukraine. Its cultivation is primarily concentrated in Kyiv, Kharkiv, Mykolaiv, and Kherson regions. The cost of commercial amaranth seeds is approximately 20,000–30,000 UAH/ton, with a price of 20,000 UAH/ton being advantageous for both farmers and processors. This price allows effective competition with imported alternatives, such as seeds from India. Organic amaranth cultivation ensures even greater profitability, as its price increases by 30–50% compared to regular seeds. This factor contributes to the expansion of organic production areas and growing interest in the crop among producers and processors [12].

Thanks to its versatility and potential in various processing industries, amaranth has been recognized as the "crop of the 21st century" by the Food and Agriculture Organization of the United Nations (FAO). In recent years, its popularity in Ukraine has grown significantly, reflected in the increase in the cultivated areas for this crop (Fig. 4). The development of the amaranth industry in Ukraine positions it to become a global leader. Annual price growth for amaranth products is about 12%, which significantly exceeds the price growth rates of staple grains like wheat, rice, or corn, where growth averages no more than 6%.

Amaranth has increasingly been cultivated for use in the food, feed, and pharmaceutical industries, as well as in the production of cosmetics and eco-friendly products [13]. By 2024, the cultivated area for amaranth is projected to increase to 10,000 hectares, driven by growing demand for the crop. The leaders in cultivated areas are Volyn, Dnipropetrovsk, and Odesa regions, with Volyn standing out as having the largest amaranth acreage in the country. This growth in amaranth acreage underscores its importance as a crop that meets both domestic market and export needs. It also highlights its potential to diversify agricultural products and contribute to the further development of Ukraine's agricultural sector.

By adhering to effective agrotechnology, amaranth cultivation can yield up to 15 tons per hectare. Therefore, the forecasted volume of amaranth seeds for 2024 can be calculated as: 15 × 10,000 = 150,000 tons/year.

In the compound feed industry, the use of amaranth seeds is driven by their high content of protein, amino acids, trace elements, and biologically active substances. Amaranth seeds offer several advantages that make them a valuable component in compound feeds.

Advantages of using amaranth seeds in compound feeds:

1. Seeds contain up to 18–20% protein enriched with essential amino acids such as lysine and methionine, which promote the growth and health of animals and poultry.

2. Amaranth enhances the nutritional value of compound feeds and contributes to a balanced diet.

3. Natural antioxidants and saponins present in the seeds improve immune response in animals, reducing the need for antibiotics.

4. Amaranth can partially replace traditional protein sources, such as soybean meal, lowering production costs for compound feeds.

5. Due to its properties, amaranth seeds improve digestion and the absorption of other feed components.

Disadvantages of amaranth:

1. The cost of amaranth can be higher than traditional components, limiting its use in budget feeds. Current market prices range from 20,000 to 25,000UAH/ton.

2. For effective use in feeds, the seeds require preliminary processing, such as extrusion or grinding.

Amaranth in Ukraine is actively processed for use in various industries, but the most common product is oil. It is estimated that about 10–15% of the amaranth harvest is used for oil production. This is due to the high value of the product, thanks to its squalene content, which is utilized in cosmetics, pharmaceuticals, and the food industry.

In Ukraine, the production cost of amaranth oil does not exceed $40 per liter, while prices on the global market are significantly higher. In Europe and America, the average wholesale price is $150–200 per liter, and in

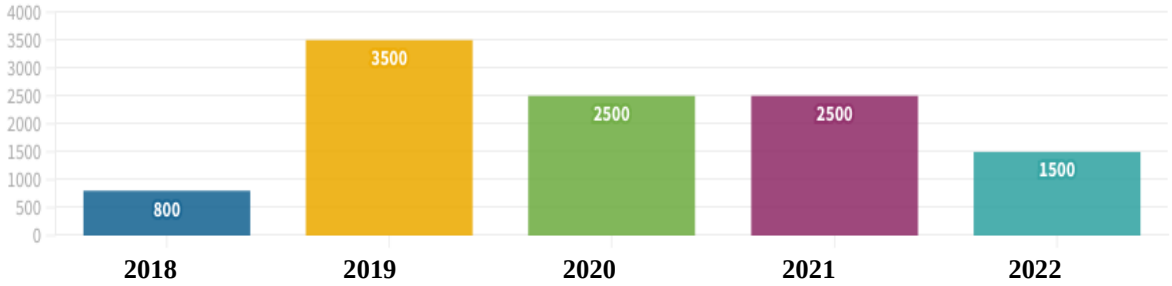

Fig. 4. Dynamics of changes in amaranth cultivation areas

Asian and African countries, it is $80–100. According to a study by the marketing company Markets and Markets, the global amaranth oil market in 2017 was valued at $550 million, with an annual growth rate of approximately 12%. Ukraine's share in this market currently accounts for less than 1%.

The remainder of the amaranth harvest is processed into other products:

- Groats and flour, used in the food industry.
- Meal, utilized as a feed additive.
- Raw material for biogas, especially plant mass residues.

Amaranth is also exported as organic seeds and other processed products, ensuring stable demand for the crop in the international market [12, 14].

Assuming that 15% of the total amaranth harvest is processed into oil, then: 150,000 × 15% = 22,500 tons. When cold pressing amaranth seeds (at temperatures up to 40°C), the oil yield is 3–4%. Over 95% of the processed seeds are converted into meal, which contains up to 20% protein with a well-balanced amino acid composition. The forecasted meal output for 2024 is: 22,500 × 95% = 21,375 tons.

Amaranth meal is a by-product obtained after extracting oil from amaranth seeds. This product is highly valuable due to its chemical composition and wide applications in various industries. Using meal reduces food production waste. It is an alternative source of plant-based protein for dietary nutrition and animal feed. The meal has antioxidant properties due to its squalene, polyphenols, and tocopherols content.

Amaranth meal is used in compound feed production, improving animal immunity and enhancing nutrient absorption. It significantly surpasses traditional grains (wheat, corn, barley) in nutritional value. Its use reduces reliance on other protein components and enables the creation of next-generation compound feeds [12].

The cost of feed-grade amaranth meal in Ukraine varies depending on the product form (granulated or not), purchase volume (small-scale or wholesale), as well as region and producer. Average prices for amaranth meal are:

- Wholesale purchases: about 12–20 UAH/kg, depending on quality and delivery conditions.
- Retail offers: prices may be slightly higher, up to 25 UAH/kg.

For example, granulated meal, often used as a feed additive for poultry and livestock, is considered an effective and eco-friendly product. Its use improves weight gain and overall animal health, particularly in farms focused on quality livestock or poultry feeding.

Conclusions

Thus, while the Ukrainian compound feed industry is currently experiencing a crisis, it has potential for recovery with government support, investment attraction, and the introduction of new technologies. Overcoming challenges will strengthen the country's food security and ensure its competitiveness on the international level. Poultry farming is the most promising industry due to high profitability, increased demand on the product market, quick return on investment and availability of fodder base.

Given the need to identify alternative raw materials to address the protein supply issue and reduce reliance on grain-based raw materials, we propose the use of amaranth and its processed products in compound feed production. Amaranth is a promising crop for use in compound feed due to its high content of protein, amino acids, trace elements and biologically active substances.

REFERENCES

1. Market of products of the feed industry in todays conditions / Yevtushenko V.V. ta in. // Visnyk Khersonskoho natsionalnoho tekhnichnoho universytetu. 2024., v. 89, T. 2. S. 265-268.
2. Proagrogroup: [Veb-sait]. Kyiv, 2024. URL: https://proagro.com.ua/events/date/2024/ukrainian-livestock-summit-2024 (data zvernennia: 11.11.2024).
3. Suchasni kormovi dobavky u hodivli ptytsi: Monohrafiia / R.A. Chudak, Yu. M. Poberezhets, H. I. Lotka, I. M. Kupchuk. Vinnytsia: TVORY, 2021. 280 s.
4. 7 prychyn dodaty amarant do kombikormu // Kurkul: [Veb-sait]. Odesa, 2024. URL: https://kurkul.com/spetsproekty/790-7-prichin-dodati-amarant-do-kombikormu (data zvernennia: 10.08.2024).
5. Lahotiuk V. O. Analiz tendentsii rozvytku haluzi ptakhivnytstva v Ukraini // Ekonomika i suspilstvo. 2018, № 16, 156-163.
6. Alltech Agri-Food Outlook, 2024.
7. Vyshnytska S. V. Stan ta tendentsii rozvytku vitchyznianoho rynku kombikormiv ta biolohichnykh mineralno-vitaminnykh dobavok / S. V. Vyshnytska, O. V. Zozulov // Ekonomichnyi visnyk NTUU "Kyivskyi politekhnichnyi instytut". - 2023. - № 26. - S. 102-108.
8. Ahropromyslovyi kompleks Ukrainy, ohliad nishi ta realii sohodennia // YC.Market: [Veb-sait]. Odesa, 2024. URL: https://blog.youcontrol.market/aghropromislovii-komplieks-ukrayini-oghliad-nishi-ta-riealiyi-soghodiennia/ (data zvernennia: 28.02.2024).
9. Global grain stocks plummet to 10-year low as consumption outpaces production: IGC // millingmea: [Website]. Odesa, 2024.

URL: https://www.millingmea.com/global-grain-stocks-plummet-to-10-year-low-as-consumption-outpaces-production-igc/ (viewed on: 01.12.2024).
10. IGC sees global grain stocks tightening // World-grain.com: [Website]. Odesa, 2024. URL: https://www.world-grain.com/articles/20735-igc-sees-global-grain-stocks-tightening (viewed on: 01.12.2024).
11. Kretova L.Iu. Poiasniuvalna zapyska do dyplomnoi roboty stupenia vyshchoi osvity «Mahistr» na temu: Obgruntuvannia tekhnolohii vyrobnytstva kombikormiv z vykorystanniam pektynovmisnoi syrovyny https://dspace.dsau.dp.ua/bitstream/123456789/5751/1/%D0%9A%D1%80%D0%B5%D1%82%D0%BE%D0%B2%D0%B0_%D0%9B.%D0%AE..pdf.
12. Amarant: sfery zastosuvannia i perspektyvy rynku // Propozytsiia - Holovnyi zhurnal z pytan ahrobiznesu: [Veb-sait]. Odesa, 2024. URL: https://propozitsiya.com/ua/amarant-sfery-zastosuvannya-i-perspektyvy-rynku (data zvernennia: 02.07.2024).
13. Alternatyva 2023: kultura, shcho daie do 35 000 hrn prybutku z ha // Kurkul: [Veb-sait]. Odesa, 2024. URL: https://kurkul.com/spetsproekty/1416-alternativa-2023-kultura-scho-daye-do-35-000-grn-pributku-z-ga (data zvernennia: 25.05.2024).
14. Ploshchi pid amarantom ta obsiahy pererobky vrozhaiu zrostut — ekspert // Holovnyi sait dlia ahronomiv. Superagronom: [Veb-sait]. Odesa, 2024. URL: https://superagronom.com/news/7943-ploschi-pid-amarantom-ta-obsyagi-pererobki-vrojayu-zrostut--ekspert (data zvernennia: 26.05.2024).

УДК 636.085.55:633.25:636.5

Н.В. Ворона, канд. техн. наук, доцент, *E-mail: tarnin@te.net.ua*
Б.В. Єгоров, д-р техн. наук, професор, *E-mail:bogdanegoroff58@gmail.com,*
А.В. Макаринська, д-р техн. наук, доцент, *E-mail:allavm2015@gmail.com*
А.П. Лапінська, канд. техн. наук, доцент, *E-mail: alocnka.onaft@gmail.com*
О.О. Ходаківський, магістр ОНТУ, *E-mail: jur_@ukr.net*
Кафедра технології зерна і комбікормів, Tel. +38048 7124013
Одеський національний технологічний університет, вул. Канатна, 112, м. Одеса, 65039, Україна

ПЕРСПЕКТИВИ ВИКОРИСТАННЯ АМАРАНТУ ТА ПРОДУКТІВ ЙОГО ПЕРЕРОБКИ У СКЛАДІ КОМБІКОРМІВ ДЛЯ СІЛЬСЬКОГОСПОДАРСЬКОЇ ПТИЦІ

Анотація

Встановлено, що ефективність тваринництва значною мірою залежить від якості комбікормів, оскільки вони становлять до 70% у структурі собівартості продукції. Основними джерелами сировини для комбікормів є зернові культури, бобові, олійні насіння та побічні продукти їхньої переробки (шрот, макуха). Нестабільність врожаїв, залежність від погодних умов, коливання цін на агропродукцію, а також зростаюча конкуренція на ринку сировини ускладнюють забезпечення комбікормових підприємств необхідними ресурсами. Представлено позитивну динаміку змін обсягів світового виробництва комбікормів з 2018 по 2023 роки. Узагальнено зміни обсягів виробництва комбікормів в Україні з 2019 по 2023 роки. Доведено, що стан комбікормової галузі в Україні в умовах війни зазнав значних змін через вплив військових дій, економічних труднощів і порушення логістичних ланцюгів. В результаті окреслено основні тенденції: зменшення виробництва, підвищення собівартості, зниження якості продукції. Проаналізовано розподіл об'єму виробництва комбікормів в Україні у 2023 році за видами сільськогосподарських тварин та птиці. Встановлено, що найбільшу долю займає виробництво комбікормів для сільськогосподарської птиці завдяки ефективності вирощування, індустріалізації виробництва та доступності технологій. Доведено, що за останні 10 років світові запаси зерна зазнали значного скорочення, досягнувши найнижчого рівня за цей період. Залежність вітчизняного кормовиробництва від зернових культур зумовлює високу чутливість тваринницьких, птахівницьких і рибних господарств до таких чинників, як погодні умови, врожайність, економічні інтереси у сфері землекористування, динаміка продовольчого ринку, а також імпортна політика країни. До цієї проблеми можна ще додати питання білкового забезпечення тваринництва. Доведено, що амарант може частково вирішити білкову проблему та знизити залежність від зернових у виробництві комбікормів для птиці. У комбікормовій промисловості використання насіння амаранту обумовлене високим вмістом білка, амінокислот, мікроелементів та біологічно активних речовин. Амарант в Україні активно використовується для переробки в різних галузях, але найпоширенішим продуктом є олія. Встановлено, що вартість амаранту може бути вищою за традиційні компоненти, що обмежує його використання у бюджетних кормах. Ціна на ринку 20000 – 25000 грн/т. Обґрунтовано доцільність використання макухи амарантової у комбікормах. Вона є побічним продуктом, що утворюється після віджиму олії з насіння амаранту. Макуха використовується у виробництві комбікормів, які покращують імунітет тварин і забезпечують краще засвоєння поживних речовин. Амарантова макуха значно перевершує традиційні зернові культури за поживними властивостями. Її використання дозволяє знижувати залежність від інших білкових компонентів і створювати комбікорми нового покоління.

Ключові слова: амарант, амарантовий шрот, світові обсяги виробництва комбікормів, сільськогосподарська птиця, світові запаси зерна

Received 27.11.2024 **Revised 20.12.2024**
Reviewed 12.12.2024 **Approved 04.03.2024**

Cite as Vancouver Citation Style
Vorona N., Iegorov B., Makarynska A., Lapinska A., Xodakivsyi O. Prospects for the use of amaranth and its processing products in the composition of compound feed for poultry. Grain Products and Mixed Fodder's, 2025, 25 (1, 97): 41-46.
DOI https://doi.org/10.15673/gpmf.v25i1.3078

Cite as State Standard of Ukraine 8302:2015
Prospects for the use of amaranth and its processing products in the composition of compound feed for poultry Analysis of the state of the poultry industry and hidden opportunities. / Vorona N. et al. // Grain Products and Mixed Fodder's, 2025, Vol. 25, Issue 1 (97). P. 41-46. **DOI https://doi.org/10.15673/gpmf.v25i1.3078**