*рний огляд результатів використання провідними вітчизняними вченими кормових підкислювачів у годівлі тварин та птиці. Наведено результати випробувань, які показали, що використання кормового підкислювача годівлі молодняка свиней має значний вплив на біохімічні показники крові, якість м'яса та інтенсивність росту тварин. Інші дані показали, що додавання підкислювачів до раціону курчат-бройлерів у сприяло збільшенню виживаності, призводить до економії кормів при зростанні продуктивності. Також у статті наведені основні перспективи, проблеми використання підкислювачів у комбікормовому виробництві та шляхи їх вирішення.*

**Ключові слова: підкислювач, інтелектуальна власність, корм, добавка, стан, перспективи, виробництво, комбікорм.**

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# VETOZIM MULTI - AN INNOVATIVE SOLUTION FOR THE POULTRY INDUSTRY

***Abstract***

*The materials of the article describe the role and purpose of enzymes in feed production, in particular for poultry farming. The composition of the multienzyme preparation Vetozym Multi from the company "Vetsintez" is characterized, which contains a complex of enzymatic activities: glucanase, xylanase, cellulase, protease, amylase, mannanase, phytase. The practical results of using the multienzyme preparation Vetozym Multi as part of compound feeds for broilers are presented. The recipes of the compound feed Grower for broilers are calculated and the optimal rate of enzyme introduction is established in the amount of 100 g per 1 t. The percentage of microcomponents introduced into the compound feed Grower for broilers is compared and the nutritional indicators of compound feed without and with the use of the multienzyme preparation Vetozym Multi are calculated. It was established that the introduction of the enzyme allows to reduce from 20 to 30% monocalcium phosphate in the composition of the recipe, due to the existing phytase activity. Vetozym Multi significantly increases the efficiency of feed use, an increase in average daily weight gain of broilers by 1..2.5 g is observed, the conversion rate of compound feed for poultry is reduced by 0.02…0.07 and the cost of recipes is reduced by 300-500 UAH/t, which became possible due to the optimization of the use of sunflower and grain products with a high fiber content. The presence of thermostable enzymes in the composition of the Vetozym Multi preparation allows it to be used in the production of compound feeds with advanced heat treatment at a conditioning and granulation temperature of up to +90 °C, which will contribute to a more complete breakdown and assimilation of raw material components, in particular carbohydrates, proteins and fiber. Calculation of economic indicators shows that the drug Vetozym Multi not only provides balanced nutrition for poultry, but also allows you to reduce the cost of feed due to more efficient use of less expensive components.*

**Keywords: enzymes, activity, drug Vetozym Multi, feed, efficiency, poultry farming.**

## Introduction

In the modern world of poultry farming, where every parameter of productivity and efficiency is of great importance, the indispensible desire for innovation is key. The market is constantly looking for ways to optimize production processes, reduce costs and improve the quality of livestock products. In this context, the entry into the feed production market of the multi-enzyme composition "VETOZYM MULTI" from the company "Vetsintez" in fruitful cooperation with leading specialists of the company "MEGA KORM" has become a real breakthrough, offering an effective solution for a wide range of challenges faced by poultry farms.

## Literary review and formulation of the problem

### Poultry farming issues

Poultry farms are constantly faced with the need to increase productivity and product quality while reducing costs. The main challenges consist of the following issues:

1. The high cost of feed, which accounts for a significant share of production costs.

2. The need to ensure balanced poultry feeding, which requires precise recipes and compliance with certain standards.

3. Problems with poultry health, in particular with digestive disorders due to poor-quality or incomeplete, unbalanced feeding.

4. Environmental challenges associated with ammonia emissions and excessive nitrogen, which affect the environment, microclimate in poultry houses and the quality of meat products.

**Description of the enzyme composition**

"VETOZYM MULTI" is a unique multi-enzyme composition that includes the following components:

1. Glucanase - this enzyme plays a critical role in the breakdown of β-glucans contained in cereals. Glucanase reduces the viscosity of chyme in the gastrointestinal tract and improves the absorption of nutrients.

2. Xylanase - an enzyme that breaks down xylans, which are key components of hemicellulose in plant cells. Its action improves the digestibility of feed, allowing the bird to absorb more energy from the consumed feed.

3. Cellulase - this enzyme breaks down cellulose, which is the main component of fiber. Cellulase helps convert cellulose into glucose, which can then be used by the bird as an energy source.

4. Protease – provides the breakdown of proteins into amino acids, which is necessary for their absorption and use by the body. The composition of "VETO-ZIM MULTI" contains three types of proteases:

• Acid protease (900 U/g): active in the acidic environment of the stomach, promotes the initial breakdown of proteins.

• Alkaline protease (4800 U/g): most active in the alkaline environment of the small intestine, where the main process of amino acid absorption occurs.

• Neutral protease (1800 U/g): works at a neutral pH level, providing an additional splitting effect in different parts of the digestive tract.

5. Amylase – this enzyme is critically important for the digestion of starch, converting it into sugars that are easily absorbed. Amylase increases the energy value of the feed and provides a stable source of energy for the bird.

6. Mannanase is an enzyme that specializes in the breakdown of mannans, which are part of hemicellulose. Its activity can improve the efficiency of the feed, reducing its viscosity and promoting better absorption of nutrients.

7. Phytase is a key enzyme in the release of phosphorus bound in phytic acid. Phosphorus is an essential mineral for bone development and energy metabolism. Phytase also helps reduce the environmental burden by reducing phosphate emissions into the environment.

This combination of enzymes provides a comprehensive approach to optimizing poultry diets, allowing not only to improve their digestibility and reduce feed costs, but also to significantly improve the health of the bird and the environmental performance of poultry farms.

**Tabl 1 – Enzymatic activity of the multienzyme complex "VETOZYM MULTI"**

| | Enzymatic activity | U/g |
|---|---|---|
| 1 | Xylanase | 27500 |
| 2 | β-glucanase | 6600 |
| 3 | Protease | 7500 |
| 4 | Cellulase | 5600 |
| 5 | Amylase | 3300 |
| 6 | Mannanase | 200 |
| 7 | Phytase | 7500 |

## Materials and methods

In the experimental part of the work, the calculation of feed recipes for broilers was carried out using the BestMix software package, which allows you to optimize recipes according to two functions: cost and nutritional value (Fig. 1). The calculated feed recipes were manufactured in the production conditions of the feed plant of LLC "Mega Korm".

The assessment of the chemical composition and nutritional value of feed for broilers was carried out in accordance with standard methods and DSTU. All indicators were determined by arbitration and express methods in the conditions of the production laboratory of LLC "Mega Korm" (Fig. 3). The average daily weight gain of broilers was determined by daily control weighing of birds in the experimental groups and averaging the data obtained. The assessment of feed conversion was calculated as the ratio of the consumed feed to the average daily weight gain of broilers.

## Results of the study and their discussion

The launch of "VETOZYM MULTI" on the market was a response to the numerous challenges faced by poultry farmers and has already shown significant positive results in practice, confirming its effectiveness.

**Transformation of poultry farming with "VETOZYM MULTI"**

Thanks to its unique formula, "VETO-ZYM MULTI" opens up new prospects for poultry farms, providing a comprehensive solution to a wide range of problems that traditionally complicated production in this industry. The use of this multi-enzyme complex has brought noticeable positive changes that cover all aspects of poultry farming.

**Feed use efficiency**

First of all, "VETOZYM MULTI" significantly increases the efficiency of feed use, a decrease in the conversion rate of compound feed for poultry by 0.02...0.07 is observed. The enzymes included in the complex are thermostable and withstand the effects of conditioning and granulation temperatures up to +90°C, and also contribute to a more complete breakdown and assimilation of raw material components, in particular carbohydrates, proteins and fiber. This not only provides balanced nutrition for poultry, but also allows you to reduce the cost of feed due to the more efficient use of less expensive components, such as, for example, sunflower cake.

**Improving the health and productivity of poultry**

Thanks to the optimization of compound feed formulations and increasing their digestibility, the composition "VETOZIM MULTI" contributes to improving the overall health of poultry. Reducing the load on the digestive system and providing the necessary nutrients in an easily digestible form leads to a decrease in the frequency of diseases, an increase in average daily weight gain by 1...2.5 g and improving the quality of carcasses.

**Economic effect and productivity improvement**

The use of "VETOZIM MULTI" not only theoretically promises advantages, but also demonstrates impressive results in practice. The introduction of this multienzyme complex into the poultry diet in the amount of 100 g per 1 ton of feed leads to a significant reduction in the cost of recipes - by an indicator of ±300-500 UAH/t, which became possible due to the optimization of the use of sunflower and grain products with a high fiber content. In addition, there is a decrease in the use of monocalcium phosphate by 20...30% due to the introduction of highly effective phytase (Fig. 2), which not only reduces the cost of feed, but also contributes to environmental friendliness, reducing the level of phosphorus released into the environment.

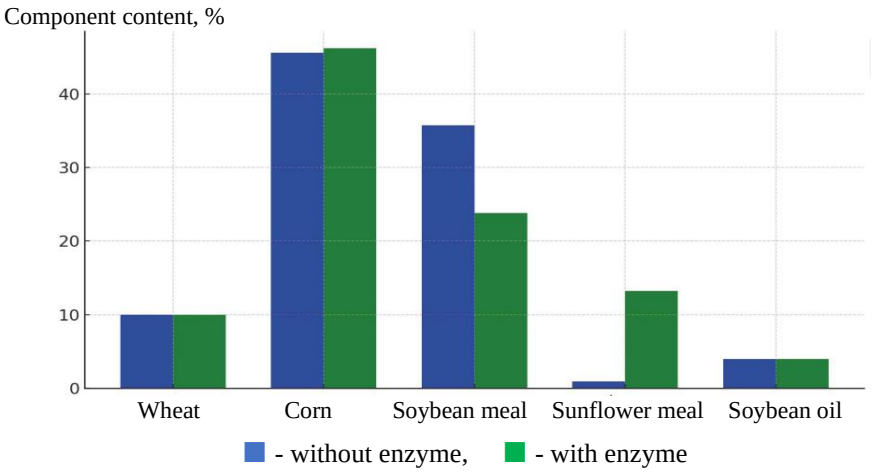


**Fig. 1. Comparison of recipes for Grower feed for broilers**

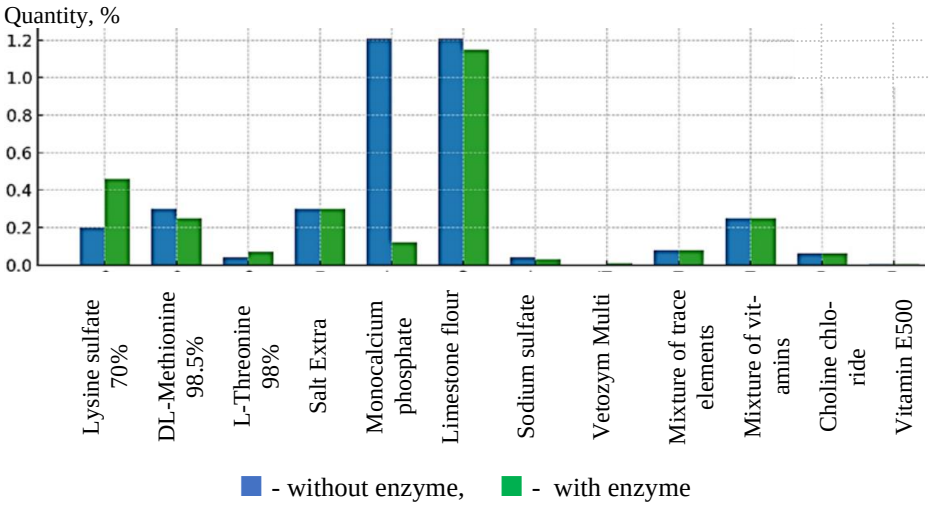


**Fig. 2. Comparison of microcomponents of Grower feed for broilers**

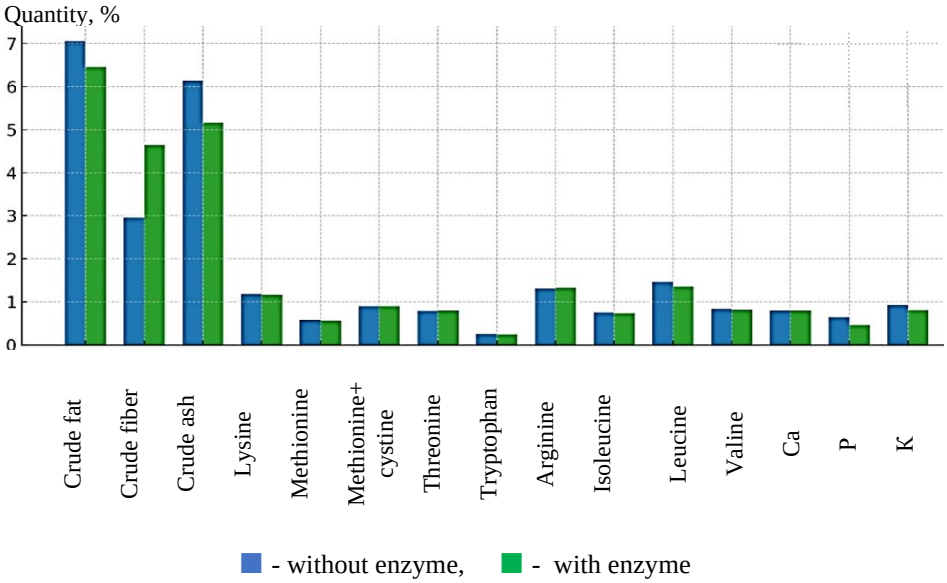


**Fig. 3. Comparative nutritional values of Grower feed for broilers**

**Improvement of microclimate and product quality:**

"VETOZIM MULTI" significantly improves the microclimate in poultry houses, reducing the level of ammonia and nitrogen, which are released during the life of the bird. This not only creates better conditions for the growth and health of the livestock, but also reduces the risk of disease. Improving the quality of litter and air in poultry houses also leads to a decrease in problems such as chemical burns on the fillet and frostbite on the legs, which ultimately increases the quality of products and reduces the percentage of culling. For the egg direction of poultry farming, we have better egg shell quality, namely a decrease in the amount of dirt and fighting.

**Conclusions**

The use of "VETOZIM MULTI" allows poultry farms not only to implement more economical solutions in their production processes, but also to achieve impressive results in improving productivity and product quality, while reducing environmental impact. Concrete figures and facts testify to the significant advantages that "VETOZIM MULTI" offers to poultry farms, making it not only an innovation on the market, but also a necessary investment in the future of this industry.

All these factors together create a unique synergistic effect that turns the use of "VETOZIM MULTI" into an effective and strategically important step for poultry farms seeking to optimize their processes and increase competitiveness in the market.

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# ВЕТОЗИМ МУЛЬТИ - ІННОВАЦІЙНЕ РІШЕННЯ ДЛЯ ГАЛУЗІ ПТАХІВНИЦТВА

***Анотація***

*В матеріалах статті наведено роль та призначення ферментів у кормовиробництві, зокрема для птахівництва. Надано характеристику складу мультиферментного препарату Ветозим Мульти компанії «Ветсинтез», який містить комплекс ферментативних активностей: глюканазу, ксиланазу, целюлазу, протеазу, амілазу, маннаназу, фітазау. Представлені практичні результати використання мультиферментного препарату Ветозим Мульти у складі комбікормів для бройлерів. Розраховано рецепти комбікорму гровер для бройлерів та встановлено оптимальну норму введення ферменту у кількості 100 г на 1 т. Проведено порівняння відсотку введення мікрокомпонентів до складу комбікорму гровер для бройлерів та розраховано показники поживності комбікорму без та з використанням мультиферментного препарату Ветозим Мульти. Встановлено, що введення ферменту дозволяє зменшити в складі рецепта від 20 до 30 % монокальцій фосфат, за рахунок наявної фітазної активності. Ветозим Мульти значно підвищує ефективність використання корму, спостерігається збільшення середньодобових приростів маси бройлерів на 1..2,5 г, зниження показника конверсії комбікорму для птиці на 0,02…0,07 та зниження собівартості рецептів в межах 300-500 грн/т, що стало можливим завдяки оптимізації використання продуктів переробки соняшнику та зернових з високим вмістом клітковини. Наявність у складі препарату Ветозим Мульти термостабільних ферментів дозволяє використовувати його при виробництві комбікормів з поглибленою тепловою обробкою при температурі кондиціювання та гранулювання до +90$^{O}$C, що сприятиме більш повному розщепленню та засвоєнню сировинних компонентів, зокрема вуглеводів, білків та клітковини. Розрахунок економічних показників свідчить, що препарат Ветозим Мульти не тільки забезпечує збалансоване харчування для птиці, але й дозволяє знижувати вартість кормів за рахунок ефективнішого використання менш дорогих компонентів.*

**Ключові слова: ферменти, активність, препарат Ветозим Мульти, корми, ефективність, птахівництво.**

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# FEED LYSIN. MEANING AND SYNTHESIS

***Abstract***

*The intensification of animal husbandry depends on the full feeding of farm animals, which provides for the content of the most important nutrients and biologically active substances in the feed. In order to obtain the necessary amount of high-quality livestock products, to ensure high reproductive capacity of animals, specialists develop animal feeding rations taking into account minimum feed costs. Providing farm animals with fodder protein is one of the important tasks of agriculture and enterprises that produce protein fodder or obtain it in the form of by-products. The use of by-products of food processing is of great importance in animal feeding programs and also solves the problem of disposal of these by-products. The application of such solutions will allow to reduce the need of farms for fodder grain, fodder of animal origin and other expensive components used in feeding. Protein feeds of plant origin include sunflower processing products as the cheapest source of feed protein in Ukraine. The inferiority of the proteins of sunflower cake and meal should be compensated with synthetic amino acids. Lysine, as an essential amino acid, has a wide range of applications, covering various fields from medicine to the food industry and agricultural activities, in particular in the feed industry. Most of the produced lysine is used in the production of feed additives (for pigs and poultry), which significantly increase the nutritional value of vegetable feed with a low lysine content. The addition of lysine to compound feed improves protein digestibility by animals and reduces feed costs for the production of livestock products. Given the availability of lysine and taking into account livestock statistics, namely the increase in the number of pigs and the decrease in the number of cattle and poultry, industrial production of lysine as a feed additive for pigs is a promising direction. The main methods of lysine production are considered - chemical, chemical-enzymatic, biological and microbiological. The technology of each method is analyzed in detail, the advantages and disadvantages of different methods of obtaining lysine are given.*

**Keywords: animal husbandry, protein, protein feed, amino acids, lysine, production methods, technology.**