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INFLUENCE OF ENZYME PREPARATIONS ON PRODUCTIVE AND MORPHOLOGICAL INDICATORS OF BROILER CHICKENS

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ABSTRACT

According to the results of the study, an increase in live weight of poultry for 42 days of rearing by 13% (** $P < 0.001$) and a decrease in feed consumption per 1 kg increase by 0.09 kg or 5%. The level of average daily gains and preservation is higher by 13% and 5%, respectively.

The experimental group receiving the enzyme preparation in addition to the main diet had a higher weight of gutted carcass by 17%, hemoglobin in broiler chickens by 7.1 g/l higher and an increase in erythrocytes by 0.27 T/l or 8% compared with the control group.

The use of the enzyme preparation in the feed for broiler chickens is economically justified: an increase in revenue by 17%, profit from sales by 41.5% and the level of profitability by 7.7%.

Keywords: broiler chickens, new feed additive, blood, internal organs, gains, feed conversion.

Actuality of theme. Poultry farming in Ukraine is a branch of agriculture that provides the population with valuable dietary products, it is the most dynamic and intensive branch of agricultural production, which can overcome the economic difficulties in a very short time.

Meat of chickens, hens and turkeys, as well as chicken eggs are easily digested and more fully absorbed by the body, so they are widely used to feed the weak and sick, as well as children.

Production of poultry products is growing every year. The annual growth rate of meat production in the world averages 4-6%, egg production - 1.5-2%.

The need for further development of poultry is due to the fact that the cost of feed for protein and energy production compared to other products of animal origin is the lowest. If you compare the efficiency of feed use, 1 calorie of broiler meat requires 2 times less feed units than 1 calorie of milk, and 3 times less than beef and pork. One gram of pure protein in eggs and poultry consumes 8 times less feed than beef and 3 times less than pork. It should also be noted that in poultry farming to obtain 1 ton of meat takes 12 times less time than in livestock and 8 times less than in pigs.

Thus, it is safe to say that the development of poultry farming is significantly influenced by breeding work, which aims to improve breeding and productive qualities, as well as the creation of new breeds, lines

and crosses of all species of poultry. This means that scientifically sound technologies for feeding and keeping birds must be used.

A broiler is a hybrid meat chicken that is not older than 10 weeks of age. Broiler chicken is obtained from chickens of meat or meat-egg breeds, lines in specialized breeding. They are characterized by intensive growth, precocity, tender dietary meat, excellent meat qualities, smooth and elastic skin, soft cartilage of the chest. Due to the intense yellow color of the skin, broiler carcasses have an excellent marketable appearance.

In modern practice of poultry development to poultry diets, as additives, add biologically active substances: enzymes, vitamins, trace elements, antioxidants and antibiotics, which promote better feed intake, increase body resistance, and have a positive effect on digestive gland secretion and metabolism, but themselves do not participate in the breakdown of feed nutrients. The most important of the biologically active substances are enzymes. But enzyme preparations differ significantly from the above stimulants, as they are biocatalysts that affect the digestibility of nutrients in feed.

The action of enzymes in nature is multifaceted, as all vital manifestations are connected with their functions. Under their influence in the digestive tract of animals is the breakdown of all nutrients of feed masses,

which are converted into energy and structural materials necessary for reproduction and growth, as well as production and implementation of biological synthesis in living organisms [9].

Enzyme preparations improve the chemical composition of rations and increase the digestibility of feed nutrients, which has a positive effect on poultry productivity. Judging by experimental studies, the use of enzyme preparations determines the more efficient use of feed and targeted impact on poultry productivity.

Analysis of recent research and publications. Modern industrial meat and egg production technology is based on poultry biology. In the process of domestication for-to achieve high economic performance, man has changed the nature of the bird.

The characteristics of the bird include: high normal body temperature, fertility and precocity, lack of teeth, embryo development outside the mother's body, hatching instinct, annual change of plumage, omnivorousness, ability to acclimatize, as well as the ability to produce under artificial conditions and carry without males [5].

The digestive organs of birds include: beak, mouth, esophagus, ox, glandular and muscular stomachs, liver, pancreas, intestines and cloaca. The activity of these organs is interconnected, because they perform a common function in the body - digestion.

The bird grabs food with its beak and drinks water. The shape of the beak in birds is different, it depends on lifestyle. The bird has no lips, cheeks or teeth. The tongue is immobile and does not participate in the capture of food, it is only an organ of touch. In the lower part of the oral cavity, in the root of the tongue, the salivary ducts open, and in the pharynx - the mucous glands [2].

From the oral cavity, food through the pharynx enters directly into the esophagus. The esophagus in birds can be very stretched.

In the mucous membrane of the esophagus there are glands that secrete mucus. It lubricates the feed entering the ox.

In the will, the food is partially chemically treated and enters the glandular stomach in small portions. The length of stay of food in the wild depends on its quantity and composition - on average from 1.5 to 14 hours.

The glandular stomach in birds has the appearance of a small enlargement of the esophagus. Its walls are thickened, with many glands. The glands of the stomach secrete digestive juices, and this is where the digestion of proteins begins. In the glandular stomach, food mixes with the juices and from there moves to the muscular stomach.

Because the bird has no teeth, the food is crushed and ground in the muscular stomach. Grinding and grinding of food is due to gravel, which the bird swallows [1].

From the muscular stomach, food enters the duodenum. Digestive juice from the glands located in the intestinal wall, some enzymes from the pancreas and bile from the liver are released into the duodenal cavity.

The pancreas in birds is the body's main digestive gland. Its juice breaks down all feed substances. The whole digestive process takes place in the intestines.

The duodenum turns into a small one, which forms several loops and turns into a short large one. In the duodenum and small intestine, in addition to the digestion of food, there is also the absorption of digested food substances into the blood.

Where the small intestine passes into the large rectum, there are two appendages that promote digestion of fiber. The enlarged part of the intestine that lies between the cecum and the cloaca is called the rectum. It completes the intestines.

In the rectum, all digestive processes end and nutrients are absorbed. From it, food remains enter the sewer, where it is excreted [5].

The total length of the intestines of chickens is about 200 cm, ie 13-14 times greater than the length of their body. Nutrients are absorbed through the intestinal mucosa into the blood.

Unlike young laying hens, broilers have exceptionally high growth energy, especially in the first period of life (8 weeks), and are prone to obesity later. It is established that high productivity of broilers is possible only if they reach their potential weight conditions from the first days of life. That is why it is very important to start feeding the young immediately after its receipt for cultivation, no later than 12-13 hours from the moment of their hatching [6].

From the first day, chickens are fed millet, corn or small wheat groats, hard-boiled eggs, finely chopped fresh young alfalfa greens, nettles, dandelion leaves, and red carrots. From the fifth day of cultivation, mineral feeds in the form of ground chalk, crushed shells are added to their diet. Used in feed for birds and fresh food waste, bread crumbs, soaked crackers, bread crusts. Chickens love boiled potatoes. However, they do not need to give green potatoes, their sprouts, the water in which it was cooked, because in all this there is a poisonous alkaloid - solanine [13].

Dairy products are extremely valuable feed for broilers, but they should be fed carefully because they ferment quickly and their consumption leads to indigestion. It is better to use them in fermented form (cheese). If possible, it is useful to drink whey instead of water, exposing it for a short time so that it does not have time to sour. To prevent gastrointestinal diseases in chickens twice a week they are watered from a glass dish with a pale pink solution of potassium permanganate. From galvanized ware watering is not allowed [17].

From the 11th day in the feed increases the amount of grain of several species. From the same age, chickens are given animal feed. Barley and oats are fed crushed (after screening the film) in the form of wet mixtures, cooked in skim milk, whey, yogurt. Mixes should be crumbly.

Wet mixes are prepared immediately before feeding and given in such a dosage that they are eaten for 30-40 minutes and do not remain in the feeder. Food waste is fed only in boiled form, first 5-7 g per head, and then 10-15 g per day. Protein feeds of legumes, cereals (peas, lentils) also have high nutritional properties. They are fed in ground form in the composition of wet mixes in the amount of 5-10% of the volume of cereals. When the bird reaches one month of age, part of the grain feed can already be fed whole, 35-40% of them set to germinated [8].

From the first days of life until the end of rearing for chickens is useful to use vitamin green fodder. Initially, they are used in crushed fractions of 0.3 mm together with wet mixes, and with increasing age of the bird - up to 0.7-1 cm. The green mass is well glazed in suspended form. In the autumn, when the amount of green fodder decreases, it is useful to introduce green cabbage leaves and yellow pumpkin with pulp into their diet to replenish the body of chickens with vitamins. The latter not only replenishes the vitamin part of the diet, but is also a prophylactic anthelmintic food [3].

Good-quality sifted flour is fed from 5 days of age of the bird at 2-3 g per head per day, then its amount in the feed is gradually increased. Crushed mineral feeds - chalk, shell, bone meal, eggshell - are also added to the mix.

To avoid large feed losses, feeders should be filled to 1/3. It will be better to eat it when there is fresh, untrampled food in the feeders. Broilers are fed to their heart's content [3].

The nutrition of broilers must fully meet the needs of their body and ensure the intensity of growth. In farms for broilers use only the dry type of feeding (ie dry feed), because they are mostly grown indoors without grazing.

Therefore, it is important to remember that compound feeds must have all the necessary nutrients for the normal development of the broiler. The rationing of nutrients and the assessment of the nutritional value of rations (compound feeds) is carried out according to the indicators of metabolic energy, crude protein, bird fiber, as well as the content of essential amino acids, vitamins, minerals and trace elements. In terms of composition, feed mixtures and compound feeds are analyzed by counting the nutrients contained in each feed [5].

In industrial conditions, in farms broilers are fed special compound feeds. There are two periods in the feeding of broilers: the first - starting (up to 4 weeks) and the second - finishing (after four weeks of age before slaughter).

The composition of feed should include at least two types of cereals, proteins of animal and vegetable origin, protein-mineral and vitamin supplements. Broilers react to the content of corn in the feed during fattening. This is the most energetic type of feed, and it is introduced in the amount of 40-60% of the total grain. High-calorie feed is feed wheat. It is introduced into the rations up to 15-20%. Some grain feeds (oats, barley), wheat bran for fattening broilers are not of great value because they contain a lot of fiber, and the body of birds is not digested and is a ballast for the digestive tract. Fiber in feed should not exceed 3-4% [8].

The intensity of fattening of broilers largely depends on the amount of protein in the diet, its quality and ratio to other nutrients.

Protein feeds containing high levels of protein include vegetable feeds (all kinds of cakes, meal - sunflower, soybean, etc., peas), as well as animal (fish, meat and bone, whale, feather flour, dry low fat) milk, etc.) origin. The share of protein foods of plant origin in the diet should be up to 65-70%, animal - 30-35%. Moreover, protein feeds should be several varieties (3-4). This will provide the necessary set of amino acids,

increase the completeness of the diet in general and the protein in it - in particular.

When there is a lack of animal feed in the diet, the protein (lysine and methionine in amino acids) remains unbalanced. It is filled with synthetic amino acids [15].

Chickens better glaze feed in the form of grains and grains. Therefore, they choose only fractions of crushed grain from loose feed, leaving a more nutritious part of the diet at the bottom of the feeder. Therefore, broilers should be fed pelleted feed.

In the first period of growth of chickens, they should have a size of 1-2.5 mm, in the second - 3-3.5 mm.

In general, in the first week per head is fed 12-15 g of pelleted feed, the second - 20 g, the third - 40-45 g, the fourth - 60-65 g, the fifth - 75-85 g, the sixth and seventh - 90-100 g, the eighth - 100-110 g.

Positive results in broiler farming can be achieved only if the feed is enriched with vitamin complexes. An excellent source of carotenoids (provitamin A, etc.) is alfalfa or clover herb flour. Moreover, these plant species belong to the protein group and are an additional source of protein in the diet. They are included in the diet in the range of 2-3% by weight. More administration is limited by the presence of fiber in them.

In industrial conditions, compound feeds are enriched with biologically active substances (biomycin, biolite, etc.).

In addition, feed yeast, technical fats, microelements, mineral fertilizers in the form of bone meal, salt, ground chalk are introduced into the compound feed. The ratio of calcium and phosphorus in the diet should be equal to 1.8-1.5: 1 [2].

Gravel and coarse sand are needed for broilers to improve digestion and digestibility of feed. In the first 2-3 weeks, the fractions should be no more than 1-2 mm (up to 5-6 kg per thousand heads of chickens) /

With the growth of broilers, the number and amount of mechanical impurities increase. In the second period of cultivation, animal and vegetable fats are added to the compound feed in a ratio of 1: 1 [16].

Watering poultry is one of the most important factors in broiler meat production technology. The quantity and quality of water consumed determine its health, growth rate, feed consumption and affect the production economy. Water consumption depends on the breed, sex, age, live weight, level and direction of poultry productivity, feeding and other factors.

Water makes up about 70% of the body weight of poultry. Approximately 70% of water in the body of birds is inside the cells, as part of the cellular protoplasm, and 30% is intercellular water, including water that forms blood plasma [5].

Unbalanced feeding leads to metabolic disorders and reduced immunity of birds. This, in turn, leads to the fact that field viruses destroy the immune barrier and further, conditionally pathogenic microflora becomes pathogenic, and the bird gets bacterial and viral problems [18].

In the process of growing to control broilers are periodically weighed.

Enzymes are their chemical nature and classification. Enzymes are complex organic compounds of pro-

tein nature that provide specific breakdown and synthesis of substances during metabolism. Due to the fact that in the body under the action of enzymes, feed nutrients are converted into energy and plastic materials, recently began to work intensively to study the effect of additives of enzyme preparations to feed on poultry productivity [10].

Thus, enzymes or enzymes are formed in living organisms and can accelerate the course of chemical reactions in organisms. The existence of life, primarily due to the presence of proteins with enzymatic functions, as well as metabolism in all cells is determined by a certain combination of enzymes. Enzymes differ from other catalysts in that they occur in nature only in living organisms and have a high catalytic action and specificity. In addition, all chemical reactions that occur due to the action of enzymes take place at a temperature close to room temperature, normal pressure and slightly acidic, neutral or slightly alkaline reaction medium. The peculiarity of enzymes is that their synthesis and catalytic activity are controlled at the genetic level and with the participation of a number of low molecular weight compounds - reaction products or substrates.

Since studies of the chemical composition of enzymes prove that they are all proteins. They, like proteins, are characterized by high molecular weight. It can range from tens of thousands to several millions of daltons. Proof of the protein nature of enzymes is that when dissolved in water, they form colloidal solutions and do not pass through semipermeable membranes. Similar to proteins, enzymes are amphoteric electrolytes, neutral salts and are activated by heating. The fact that the enzymes have a protein nature was proved by their preparation in pure form and isolated in the crystalline state. Yes, Sumner in 1926. first isolated urease crystals. Then, in 1930-1931, the enzymes pepsin and trypsin in the crystalline state were isolated. Currently, more than 400 enzymes in the crystalline state have been obtained [11].

By chemical nature, enzymes can be divided into two groups:

- proteins (simple enzymes), which consist only of protein
- proteins (complex enzymes) that contain protein and an active group of non-protein nature.

Simple enzymes are represented by one or more polypeptide chains, and in hydrolysis, are broken down into amino acids. They belong to such classes of proteins as albumins, globulins and some other groups of simple proteins. Almost all simple enzymes catalyze hydrolysis processes, such as pepsin, trypsin and ribonuclease [9].

Many enzymes belong to the group of complex proteins. These enzymes, in addition to the protein part, contain a group of non-protein nature - cofactor. Studies have shown that the role of cofactors in protease enzymes is performed by some vitamins and their derivatives and individual phosphorus esters of monosaccharides, metal-containing complexes, nucleotides. Currently, all enzyme cofactors are divided into coenzymes, activators and prosthetic groups [7].

The classification of enzymes is based on the principles of their distribution according to the types of

chemical reactions that they catalyze: on this basis, all enzymes are divided into six classes:

1) Oxidoreductases - enzymes that catalyze oxidation or reduction. Example: catalase, alcohol dehydrogenase.

2) Transferases - enzymes that catalyze the transfer of chemical groups from one substrate molecule to another. Among the transferases, kinases that transfer the phosphate group, usually from the ATP molecule, are particularly distinguished.

3) Hydrolases - enzymes that catalyze the hydrolysis of chemical bonds. Example: esterases, pepsin, trypsin, amylase, lipoprotein lipase.

4) Liases - enzymes that catalyze the rupture of chemical bonds without hydrolysis with the formation of a double bond in one of the products.

5) Isomerases - enzymes that catalyze structural or geometric changes in the substrate molecule.

6) Ligases - enzymes that catalyze the formation of chemical bonds between substrates by hydrolysis of ATP. Example: DNA polymerase.

7) Translocase enzymes that carry molecules.

Enzymes are catalysts, they accelerate the forward and reverse reactions, so, for example, lyases are able to catalyze the reverse reaction - the addition of double bonds. Nevertheless, the direction of the reaction can involve several substrates and be such that the reverse reaction does not occur [9].

Enzymes are involved in the construction of tissues, their main function is plastic. The degree of freshness of meat is determined with the help of redox enzymes catalase and peroxidase [12].

Influence of enzyme preparations on productivity and digestibility of nutrients in poultry. Enzyme preparations are products of microbiological synthesis, which contain the main enzyme and a number of other enzymes and ballast impurities. The use of enzyme preparations in diets helps to break down substances that prevent feed utilization, as well as improves the absorption of proteins, starch and non-starch polysaccharides, phytate fiber complexes, which are not completely broken down by the body's own enzymes [9].

By adding enzymes that hydrolyze fiber to the feed, they begin to work in the intestine, opening access to valuable nutrients that would pass undigested [6].

In addition, cereals (rye, wheat, barley, oats, and other crops) contain a large amount of soluble fiber, which is an anti-nutrient factor that forms a gel in the intestines of birds, with high viscosity, resulting in suppression. activity of the body's own enzymes and more difficult to absorb processes, increases the risk of pathogens. To eliminate all these negative phenomena, feed enzymes are added to compound feeds, which accelerate the chemical reactions of metabolic processes in the body [4].

Preparations containing enzymes such as proteases and amylases activate the enzymolysis of proteins and starch, and also improves the digestibility and absorption of protein and feed carbohydrates [4, 7].

Thus, enzyme preparations are products of microbiological synthesis, which contain a huge complex of enzymes - protease, cellulase, amylase, xylanase, beta - glucanase, and others. Multienzyme preparations that break down hard-to-reach feed components into

smaller particles, suppress their negative impact on the body of poultry and increase the nutritional and energy value of plant feeds by 3 - 8%, as well as increase the content of feed components such as wheat, barley, barley meal, bran, lupine and peas. All enzyme preparations are divided into two groups: universal, those intended for introduction into compound feeds, which contain various plant feeds with non-starch polysaccharides: barley, wheat, sunflower, oats, soy and the second group - with a predominant focus on individual ingredients.

For the needs of agriculture, the industry produces enzyme preparations of bacterial and fungal origin. Fungal are obtained by the method of surface cultivation and are denoted by the letter "P", and bacterial - by deep cultivation and denoted by the letter "P".

Depending on the level of purification, enzyme preparations are divided into purified and technical. The technical ones include native untreated crops. And the purified include drugs whose activity after purification is 10-20 times greater than native. Depending on the effect of certain feed nutrients, enzymes exhibit proteolytic, amylolytic, cellulolytic and pectinolytic activity. In animal husbandry, mostly enzymes belonging to the class of hydrolases are used: proteolytic, amylolytic and pectolytic. Enzyme preparations are classified according to the activity of basic enzymes [12].

Almost all enzyme preparations are complex, ie in addition to the main component, they also contain a number of other related enzymes, their composition, amount and ratio of enzymes in them are selected and depend on the nature of both protein and grain feed [19].

In most cases, it is considered more effective to use feed enzyme preparations containing xylanase, cellulase, and P-glyconase in combination with preparations containing α -amylase, phytase, pectinase and protease [10].

Recently, special importance is attached to the use of phytase. It is this enzyme that significantly increases the absorption of organic phosphorus from feed and actively breaks down phytin complexes.

When choosing the composition of feed enzyme preparations, the species and age of the bird are also taken into account. In General, the positive effect of most known feed enzyme preparations when introduced into feed for poultry, is as follows:

- destruction of plant cell walls, which increases the availability of available fats, protein and starch for the action of enzymes of the digestive tract;
- increase the digestibility of nutrients and facilitate their absorption in the small intestine;
- reducing the negative impact of non-starch polysaccharides, especially their soluble fractions;
- compensation for the deficiency of their own digestive enzymes, especially in young animals, and in stressful situations;
- Improving the microflora in the small intestine by reducing the viscosity of the contents and increasing the level of monosaccharides [5].

The listed functions of feed enzyme preparations are accompanied by change of the following production indicators in poultry farming:

- the nutritional value of rations increases by 5-10% due to a more complete extraction of nutrients and energy release while their digestibility increases by 6-10%;
- reduced feed consumption per unit of output by 5-14%;
- poultry productivity increases by 5-12%;
- it is possible to replace such expensive feed components as soybean meal and corn with cheaper ones (triticale, wheat, barley, rye, oats, sunflower meal and meal) with high fiber content, without reduced productivity;
- decreases the amount and humidity of manure and as a consequence the humidity of the litter;
- the ecological situation of the environment improves due to more complete absorption of phosphorus and nitrogen by the body and reduction of emissions of these substances into the environment by 20-40%.

Thus, the correct selection and use of enzyme preparations in feed production makes it possible to reduce the cost of feeding and increase the productivity of poultry, with the same production costs [8].

In terms of production, enzyme preparations rank third after antibiotics and amino acids. Currently, the industry offers for feed production drugs of unidirectional action (for digestion of proteins - proteolytic, to increase the digestion of carbohydrates - amylolytic enzymes, for better fat absorption - lipolytic, cellulolytic enzymes), as well as a wide range of multienzymes [.

Artificial enzymes (combined together for three to five or more into a single complex) are intended for diets with some one predominant type of feed, for the digestion of which the main part of the enzymes included in the feed additive is designed. Today in Ukraine complex microbiological enzyme preparations of well-known firms are widely used: Kemzaim of Kemin firm, the USA; Allzheim SSF of Alltech, USA; Natuzim Bioproton, Australia; Danisco A / S, Denmark: GrindazymTM GP15000G (Grindazim), GrindazymTM Combo L (Grindazim Combo L), Danisco Xylanase 40000G (Danisco Xylanase), AextraTM XB (Acstra XV), Phyzyme XP; enzyme preparations produced by SE "Enzyme" (Ukraine) and others [12].

Sometimes different brands are produced under one brand. For example, GrindazymTM Combo L - a multi-enzyme preparation that is recommended for use in poultry diets, allows not only to introduce into the feed plant sources with high levels of fiber (sunflower and rapeseed meal or cake), but also to reduce the addition of expensive sources of phosphorus, such as monocalcium phosphate; GrindazymTM GP15000G - increases the digestibility of feeds prepared from wheat, barley, rye or triticale, and those containing peas, sunflower or rapeseed meal. Phyzyme XP line products are used to improve the absorption of phytate nutrients in poultry diets.

According to the research of Tashlytska GV, who studied the content of minerals in the meat of broiler chickens, fed the enzyme preparation "Protorzin" to broiler chickens cross Cobb-500, it was investigated that the introduction of the drug at a dose of 150 and 250 g / t of feed contributes to the increase of calcium content in white meat by 0.09 and 0.08 g / kg, respectively. Red meat has increased amounts of calcium and

iron. However, there is a tendency to reduce the amount of magnesium, manganese and copper. It was found that the feeding of the enzyme increases the live weight of poultry by 13.1%, the average daily gain - by 13.4%, the yield of gutted carcass - by 2.7% compared to control counterparts. And even earlier conducted a study on the effect of the same enzyme preparation on the productive qualities of broiler chickens, and the following data were obtained: it was found that feeding the enzyme increases live weight of poultry by 13.1%, average daily growth - by 13.4%, yield gutted carcass - by 2.7% compared to control counterparts.

According to the experiments of B. Ya. Kirilov and AV Gunchak, who observed the effect of the enzyme preparation "Natuzim" on increasing the productivity of laying hens. As a result of the conducted researches it is established that in comparison with indicators of control group introduction in a diet of hens of an egg direction of productivity of a cross of "Hayseks brown" of polyfermental preparation "Natuzim" from 20 to 40 days and from 80 to 110 days promoted better development of reproductive organs. and secondary sexual characteristics, an increase in the average daily gain of young animals and body weight at the beginning of egg-laying birds; increase in egg-laying per average laying hen by 18.53 pcs. eggs; increase in egg shell strength and weight, respectively, by 9.23% and 9.26% ($p < 0.05$). At the same time, the biological and nutritional quality of the obtained eggs improved due to the increase in the content of carotenoids, vitamins A and E ($p < 0.05$) and soluble proteins ($p < 0.001$).

According to the research of Seleznyov OO, Tsekhmistrenko SI, Polishchuk VM, Tsekhmistrenko OS, Ponomarenko NV, Polishchuk SA, who studied the effect of feeding immobilized enzyme preparations on the activity of digestive enzymes of chickens. broilers, the following data were obtained: the introduction into the diet of broiler chickens stabilized by immobilization of enzyme preparations increased the activity of hydrolytic enzymes of the digestive tract compared to their native counterparts, which improves digestibility and absorption of feed nutrients.

According to Slobodyanyuk's research, it was proved that the use of the enzyme preparation "Avizim" in poultry feeding effectively influenced their development and growth. This indicates that under the influence of enzymes in the body of birds there is an improvement in digestion and absorption of nutrients, which naturally affects the increase of energy fund and intensification of synthetic processes in the body.

When feeding enzyme preparations of this spectrum of action in the gastrointestinal tract of birds there is an increase in microbial fermentation of nutrients and enzymolysis (starch, fats, proteins), improving their digestibility and, consequently, increasing the background of energy nutrition [3].

Numerous scientific studies and many years of experience in the field of poultry farming prove that effective animal husbandry today is impossible without the use of enzyme preparations in various types of diets.

And the right enzyme preparation increases the availability of energy and nutrients in the diet, resulting in increased productivity of poultry [4].

These functions of modern enzyme preparations and their impact on the improvement of production, economic and economic indicators undoubtedly prove the reasonable need for their use in poultry feeding technology [18].

The purpose and objectives are presented by studies of the effectiveness of the enzyme preparation "Celozyme" and its impact on the productive and morphological parameters of broiler chickens, for which a scientific and economic experiment was conducted.

The task was set to study the following indicators:

- the effect of the enzyme preparation on the productivity of poultry;
- the effect of the enzyme preparation on the morphological parameters of poultry;
- the effect of the enzyme preparation on the slaughter performance of poultry;
- to investigate the condition of internal organs after the action of the enzyme preparation;
- calculate the economic efficiency of the use of enzyme preparation.

Research methodology. An experiment to study the effect of enzyme preparations on the productive and morphological parameters of broiler chickens was conducted in a private farm.

The aim of the study was to experimentally investigate the effect of enzyme preparations on the productive and morphological parameters of broiler chickens.

To achieve this goal we needed:

- to study the organization of feeding, and indicators of feed conversion and keeping of broiler chickens;
- to study the live weight, average daily gain and safety of broiler chickens;
- to analyze the morphological parameters of blood and internal organs in broiler chickens;
- calculate the economic evaluation of the results of the experiment.

The object of research were: growth intensity, morphological parameters of internal organs, enzyme "Celozyme", economic indicators of research.

One-day-old Cobb-500 cross-country chickens were selected for the study. From them 2 groups of chickens (control and experimental) on 50 heads in everyone are formed.

The duration of the experiment is 42 days. The first group - control, the second - experimental. The bird was kept on the floor with free access to water and feed in accordance with zootechnical standards for this species, the material for the litter was sawdust. The research was conducted on the basis of the vivarium and the laboratory of the Faculty of Technology of Production and Processing of Livestock Products.

The birds of the control group throughout the rearing period received a basic diet (feed TM "West Mix"), balanced according to the norms of feeding. The experimental group as a supplement in addition to the main diet was fed the enzyme preparation "Celozyme" at a dose of 0.015% by weight of feed. The scheme of the experiment is presented in table 1.

The scheme of the experiment

Group	Duration of the period, days	Number of chickens	Features of feeding
1 - control	42	50	OR (complete feed)
2 - experimental	42	50	OR + "Celozyme" at a dose of 0.015% by weight of feed

OR - the main diet

The composition of the main diet: corn, wheat, soybean meal, sunflower meal, vegetable oil, limestone, monocalcium phosphate, vitamin-mineral mixture, coccidiostatic.

The enzyme preparation "Celozyme" is used as a feed additive to increase the digestibility of protein, digestibility of starch, raffinose and stachyose. The drug is a light brown powder with a slight specific odor. The enzyme preparation is not toxic, there are no contraindications, does not interact with other substances.

The growth rate of broiler chickens was determined by live weight. It in turn was monitored by individual weekly weighing. The weighing results were used to determine the average daily gain and feed consumption for the growing period.

To study the morphological parameters of blood in broiler chickens of the control and experimental groups were taken from the axillary vein (at 42 days of age) and stabilized with anticoagulant (heparin).

The number of erythrocytes and leukocytes in the blood was determined by counting in Goryaev's chamber; hemoglobin content - hemoglobin cyanide method [17].

At the end of the experiment, a control slaughter was performed, selecting 4 heads from two groups.

The following indicators were determined:

- pre-slaughter mass;
- weight and yield of gutted carcass;
- the mass of internal organs of various body systems.

Student's t-test was used to determine the differences between the mean values. The difference was considered probable, compared with the control at * P < 0,05; ** P < 0.01; *** P < 0.001 [18].

Research results. Feeding of broiler chickens is regulated depending on age, live weight and stage of development. The growth rate of broiler chickens continues to increase from year to year, due to the increased effect of heterosis, improved nutrition, improved technology for keeping and controlling diseases.

During studies on broiler chickens cross Cobb-500, for feeding poultry used feed TM "Best-Mic". Broiler chickens were fed according to the classical scheme, which included three phases: start (0 - 14 days), growth (15 - 28 days), and finish (29 - before slaughter in 42 days).

Compound feed TM "Best-Mic" is designed in accordance with the rules, provides complete feeding, the need for digestible (digestible) amino acids and metabolic energy, which allows to obtain a high increase in live weight, and protect against heat stress and bacterial infections (table 2).

Starter feed is focused on fattening chickens for up to two weeks. Its main task is to form a good appetite and achieve maximum growth rates in the early stages of breeding birds, not less than 160 grams of live weight on the seventh day. Starter feed is characterized by a high content of metabolic energy (290 kcal) and crude protein (20%), low levels of fiber (up to 4%) and minerals (calcium - 1.1%, phosphorus - 0.8%, sodium - 0.3 %).

Table 2

Composition and nutrient content of Best-Mich feed for broiler chickens

Storage, %	Type of feed		
	Start	Growth	Finish
Wheat	45	40	26
Barley	5	12	10
Pea	-	5	5
Corn	10	-	19,8
Sunflower cake	-	13,7	18
Soybeans are extruded	9,4	24	18
Sunflower meal	16,8	3	-
Blood meal	2	-	-
Limestone	1,7	1,67	1,76
Monocalcium phosphate	0,8	0,33	0,24
Kitchen salt	0,33	0,3	0,2
in 100 g of compound feed contains,%			
Metabolic energy, kcal	305,0	320,0	325,0
Crude protein	21,00	19,00	17,00
Crude fat	3,80	4,16	5,00
Crude fiber	5,00	5,00	5,00
Lysine	1,30	1,20	1,10
Methionine	0,65	0,60	0,45
Methionine + Cystine	1,00	0,95	0,75
Threonine	0,80	0,75	0,6
Calcium	1,00	0,90	0,85
Sodium	0,14	0,14	0,16
Phosphorus	0,65	0,61	0,65

The cost of starters is a very small share of the total cost of feeding broilers in general, so when preparing a starter diet should take into account its impact on growth and health of poultry rather than cost.

The digestive system of chickens in the first days is under development, so it is necessary to ensure that the nutrients of the feed were absorbed as much as possible.

In the period from 15 to 28 days for feeding used growth feed, it reduces the level of crude protein to 14% and metabolic energy - up to 260 kcal. At the same time increase the level of crude fiber to 7.0%. The growth compound feed differs from the starter in the size of granules. Due to its introduction into the diet, broilers that have grown up are intensively building muscle tissue.

If you need any restrictions on the intensity of growth of birds, this should be achieved during the growing season. By limiting feed intake, reducing the light period. It is not recommended to limit the intensity of bird growth by changing the composition of the diet.

In the period from 29 days to slaughter in 42 days broiler chickens were fed compound feed-finish. It is

intended for feeding adults and contains a large percentage of vitamins and minerals. 100 g of this feed contains: metabolic energy - 319 kJ, crude protein - 19 g, crude fiber - 4.5, calcium - 0.9, phosphorus - 0.7, sodium - 0.3 g. The final feed has the main share costs, so the compilation of these rations is based on economic considerations. During this period, very rapid changes in the body structure of broilers are possible, so you need to be careful to prevent excessive fat deposition.

Finishing fattening of broilers is an indicator of the correctness of the chosen rearing scheme. During this period, the main criteria for the effectiveness of broiler keeping are the percentage of livestock (how many survivors) and the total live weight of the herd (growth rate). Chickens become heavier, their activity slows down, they often stand or sit on the litter near the feeders. To minimize the development of skin damage from uric acid, it is necessary to maintain cleanliness and dryness of the litter.

According to the results of research, the unequal growth intensity of broiler chickens in the control and experimental groups with the addition of the enzyme preparation "Celozyme" affected the cost of feed per 1 kg of live weight gain (table 3).

Table 3

Age of animals, days	Feed costs	
	Group	
	1-control	2-experimental
1 – 7	1,77	1,78
8 – 14	1,85	1,80
15 – 21	1,94	1,77
22 – 28	1,89	1,75
28 – 35	1,82	1,73
36 – 42	1,77	1,69
On the average for the experiment	1,84	1,75

On average, during the rearing period from 1 to 42 days of age, broiler chickens of the control group spent per 1 kg of live weight gain of 1.84 kg of feed, while in the second experimental group, this figure was 1.75 kg, which is 0.09 kg, or 5% less.

Broilers were kept in a clean, disinfected and well-ventilated room. This is very important because their immunity is very weak.

Wood chips were used as bedding because they are warm and hygroscopic.

The density of broilers should not exceed 34 kg of live weight per 1 m². And the density of young broilers

(first days) should be 30-40 heads / m². Broiler chickens older than one month are placed 12-15 heads / m².

The air exchange in the room where broilers are raised should not exceed 6 m³ / hour / kg of live weight for summer growing time, but also not be less than 3 m³ / hour / kg of live weight - for winter time of broiler breeding.

An important role in the cultivation of broilers play the length of daylight and lighting of poultry houses.

Technological parameters of temperature and lighting in the room for raising broiler chickens are shown in table 4.

Table 4

Age, weeks	Temperature, C	Lighting, hours
1	32-34	24
2	30	24
3	27	23
4	22	23
5	21	23
6	21	23

When raising broiler chickens, round-the-clock lighting is mainly used, reducing only its intensity. Intermittent lighting regimes, which have not been widely used in industrial production, are sometimes used in broiler chickens.

Live weight, average daily gain and safety of broiler chickens. The study of live weight, average daily gain and safety of broiler chickens for the introduction of the enzyme preparation in the diet of broiler chickens, shows its positive effect. During the first two

weeks of rearing, there was only a tendency to increase the live weight of poultry of the second experimental group against control (table 5).

From the 21st day until the end of broiler breeding there was a probable effect of the drug on the level of

live weight of poultry. Thus, the intensity of bird growth was probably higher from the 21st day by 12% ($P < 0.05$), from the 28th day by 12% ($P < 0.001$), from the 35th day by 10% ($P < 0.05$) and at the end of fattening at 42 days by 13% ($P < 0.001$).

Table 5

Live weight of broiler chickens (M ± m, n = 50)

Indicators	Group		Deviation +/-
	1-control	2-experimental	
Weight of chicken, g: 1 day	45,5±0,68	45,7±0,59	-0,13
7 days	173,7±10,25	180,6±6,64	+6,9
14 days	436,3±21,31	484,3±14,73	+48,0
21 days	924,4±32,68	1035,6±27,33*	+111,2
28 days	1588,7±39,65	1783,1±29,50**	+194,4
35 days	2236,2±69,70	2468,1±69,66*	+231,9
42 days	2769,4±70,83	3141,2±57,96**	+371,8
Average daily live weight gain, g	65,9	74,79	+8,89
Livestock safety,%	96	98	+5
EREF (European Productivity Index)	344	418	+74

Note. Probability of difference: * $P < 0,05$; *** $P < 0.001$

The level of average daily gains and preservation is higher by 13% and 5%, respectively.

According to the level of the European index of efficiency of broiler chickens, there is a significant difference between the control and experimental groups - at the level of 74 units.

Morphological parameters of blood and internal organs in broiler chickens. It is known that feed enzymes (enzymes) have a positive effect on the intestinal microflora of poultry, increase the digestibility of non-starch polysaccharides, increase productivity and are cost-effective.

Blood, along with lymph and tissue fluid, constitutes the internal environment of the body, which is characterized by a constant composition and physico-chemical properties. Due to this, the necessary homeostatic conditions are created for the life and activity of cells and tissues of the body.

Thus, blood is the most important physiological system involved in metabolic functions, and its morphological and biochemical parameters reflect the intensity of metabolic processes in birds and are therefore closely related to the growth, development, productivity and natural resistance of chickens.

Erythrocytes are blood cells in birds that are larger than mammalian cells, are oval in shape, have nuclei, and make up the bulk of blood cells. Functions of erythrocytes - the transfer of oxygen from the respiratory organs to body tissues and carbon dioxide from tissues to the lungs. In addition, they emit amino acids, vitamins, hormones from plasma and carry them with the blood-stream, maintain blood pH at a constant level, participate in the development of immunity, blood clotting, absorb various toxic substances on its surface [17].

Depending on feeding, maintenance, and also on features of an organism the general physiological indicators of blood of a bird can change.

Table 6 presents the results of studies of physiological parameters of the blood of broiler chickens that were fed only complete feed with and without enzyme preparation.

According to Table 6, the morphological parameters of the blood - hemoglobin, erythrocytes and leukocytes in the experimental birds of the control and experimental groups were within the reference norm. However, it should be noted that the addition of the enzyme preparation to a complete diet tends to increase red blood cells by 0.27 T / l or 8% compared to the control.

Table 6

Morphological parameters of blood

Indicators	Group		Reference norms
	1-control	2-experimental	
Erythrocytes, T / l	3,35±0,49	3,62±0,53	3-4
Hemoglobin, G / l	83,5±0,69	90,6±1,5	80-120
Leukocytes, G / l	24,4±0,64	26,1±0,72	20-40

Note. Probability of difference: * $P < 0,05$; *** $P < 0.001$

A similar trend is also observed in the level of hemoglobin and leukocytes. Thus, the hemoglobin in broiler chickens was 90.6 g / l, which is 7.1 g / l higher than the control group.

Hemoglobin is a protein substance - chromoprotein. It is a respiratory blood pigment found in erythrocytes. Forms an easily dissociating compound with oxygen - oxyhemoglobin, in which oxygen is transported

to tissues. The hemoglobin content of the blood depends on the species of animal and the general condition of the body (age, sex, health) of the bird. The amount of hemoglobin in the blood characterizes the level of intensity of redox processes [8].

Unlike erythrocytes, which move due to blood flow, leukocytes are able to actively move, penetrate the wall of capillaries and enter the intercellular space.

Leukocytes perform a protective function. The content of the number of leukocytes in the serum of the experimental birds of the second experimental group was higher than the control by 1.7 G/l.

Morphological examination of the internal organs of broiler chickens revealed no significant changes (table 7).

Table 7

Morphological indicators of internal organs, g (M ± m, n = 4)

Indicators	Group		Deviation
	And-control	II-experimental	
Muscular stomach (without content)	42,70±2,12	50,33±3,49	+7,63
Glandular stomach	8,07±0,43	9,73±0,34*	+1,66
The mass of the small intestine, g	61,2±2,77	70,3±2,13	+9,10
Mass of the large intestine, g	20,1±1,48	31,2±1,33**	+11,10
Heart	12,9±0,97	16,7±0,36	+3,80
Lungs	19,12±0,22	16,7±0,36	-2,42
Kidneys	12,52±0,39	10,97±0,68	-1,55
Spleen	2,60±0,05	2,63±0,09	+0,03
Pancreas	6,73±0,17	6,14±0,39	-0,59
Liver	68,0±4,35	65,23±1,22	-2,77

Note. Probability of difference: * P < 0,05; ** P < 0,01

Changes in the morphological parameters of the blood (erythrocytes, hemoglobin, leukocytes) in broiler chickens, in our opinion, are due to the fact that the body has adapted to the enzyme preparation.

The internal organs of broiler chickens of the control and experimental groups retained the characteristic anatomical structure, no visible macroscopic changes were found.

In the analysis of morphological parameters of the internal organs of poultry of the second experimental group, a significant increase in the mass of the glandular stomach (P < 0.05) and the mass of the large intestine (P < 0.01) compared with control indicators.

In broiler chickens of the experimental group there was an increase in the mass of the muscular and glandular stomachs by 7.63 and 1.66 g, respectively.

Indicators of the mass of the internal organs of birds of the experimental group also indicated an increase in the mass of the heart by 3.8 g and spleen by 0.03 g compared with the control with the control, which indicates a slightly higher load on these organs. At the same time, broilers of the second group had a decrease in lung weight by 2.42 g, kidneys by 1.55 g and pancreas by 0.59 g compared to control values.

Economic evaluation of the results of the experiment. The addition of the enzyme preparation "Celozyme" in addition to feed, improves the gross gain of live weight of broiler chickens by 16% and their safety by 2% (table 8).

Under the action of the introduced enzyme additive in poultry of the second group were better slaughter rates, compared with their counterparts from the control group. Thus, the weight of gutted broiler carcasses increased by 17%.

Table 8

Economic evaluation of research on poultry, (M ± m, n = 50)

Indicator	Group	
	1-control	2-experimental
Number of goals in the group	50	50
Saving,%	96	98
Gross live weight gain, kg	132,9	154
Weight of gutted carcasses, kg	94,2	110,0
The cost of 1 kg of feed, UAH	12	12
Additional costs for the drug, UAH	-	21
The cost of chickens (age 1 day), UAH	22	22
Feed costs for the whole period, kg	254	270
The selling price of 1 kg of gutted carcass, UAH	56	56
Total cost, UAH	4148	4565
Sales revenue, UAH	5275	6160
Profit from sales, UAH	1127	1595
Profitability,%	27,2	34,9

As a result, the additional introduction of the enzyme preparation to the diet of broiler chickens will increase sales revenue by UAH 468 and increase profitability by 7.7%.

Conclusions and prospects for further research.

1. Based on the research, experimentally and theoretically substantiated scientific approach to the use of enzyme preparation in feeding chickens cross Cobb-500, studied its effect on growth intensity, slaughter, morphological parameters of blood and internal organs.

2. With the introduction of the enzyme preparation to complete feed, an increase in live weight of poultry for 42 days of rearing by 13% (** P <0.001) and a decrease in feed consumption per 1 kg increase by 0.09 kg or 5%.

3. The experimental group receiving the enzyme preparation in addition to the main diet had a higher weight of the gutted carcass by 17%, hemoglobin in broiler chickens by 7.1 g / l higher and an increase in the number of erythrocytes by 0.27 T / l or by 8% compared with the control group.

4. When using the enzyme preparation at a dose of 0.015% by weight of complete feed, no significant changes were detected, the morphological parameters of the blood and the weight of the internal organs of broiler chickens were within the physiological norm.

5. The use of the enzyme preparation in the feed for broiler chickens is economically justified: an increase in revenue by 17%, profit from sales by 41.5% and the level of profitability by 7.7%.

Offers to production. When raising Cobb-500 cross-broiler chickens, in order to increase their productivity, live weight gain, slaughter performance, meat quality and increase the level of profitability, we recommend - in addition to the complete feed enzyme preparation "Celozyme" in the amount of 0.015% .

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