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BIOLOGICAL SCIENCES

THE EFFICIENCY OF USING A FEED ACIDIFIER IN GROWING BROILER CHICKENS

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ABSTRACT

The influence of the feed acidifier "Ronocid", made on the basis of organic acids with the inclusion of natural aluminosilicate and oregano essential oil, on the performance indicators of broiler chickens was investigated. It has been established that the feeding of compound feeds with the addition of acidifier helps to increase the live weight and safety of broiler chickens, reduce feed costs, increase slaughter rates: the weight of uncooked, semi-gutted, gutted carcasses, chest and thigh muscles.

Keywords: broiler chickens, acidifier "Ronocid", productivity, slaughter indicators.

Relevance. Improving consumption and increasing the efficiency of feed use in poultry farming is ensured by a high level of balanced feeding with the use of various feed additives [11]. By their intended purpose, feed additives are divided into protein, energy, mineral, vitamin, antibiotics, enzyme preparations, probiotics, prebiotics, acidifiers, mold inhibitors, toxin adsorbents and combined additives. In the early postnatal period, the bird has an underdeveloped digestive system that is not able to fully digest food. This negatively affects muscle building and internal organ development. In addition, it is during this period that various harmful microorganisms can develop in the lumen of the intestinal tract. It should be borne in mind that digestion in young animals is primarily characterized by a weak secretion of hydrochloric acid in the stomach and its low activity. In chickens in the first 7 days, less than 1 milliliter of hydrochloric acid is released. As a result of such a completely physiological reaction, not enough acid is released in order for the feed mass to swell and its alkaline properties to be completely neutralized. Only in a stable acidic environment in the stomach with a pH of less than 3.5, the enzymes that are produced in the body begin to influence digestion and maximize it. In addition, stomach acid is a decisive barrier up to a certain point for the development of pathogenic microorganisms and their penetration into the lower intestine.

Acidifiers are preparations that contain organic and inorganic acids and other substances. Of the acids, acetic, ascorbic, succinic, oily, formic, lactic, malic, propionic, benzoic, citric, fumaric, lauric and their salts are most often used. Organic acids promote the development of the chicken intestinal microflora after hatching and thus improve the condition of the gastrointestinal tract, inhibit the growth and development of pathogenic microflora (*Salmonella*, *E. coli* and others), mold pathogens in feed and feed raw materials. Simultaneously with a slowdown in the growth of gram-negative bacteria, which develop optimally at a pH of 6-7, the work of proteases improves in the gastrointestinal tract due to acidification of its content [7,12]. The pH and microbial load in the gastrointestinal tract of the bird is reduced, the absorption of nutrients is improved, weight gain is improved and the incidence of digestive

disorders is reduced. This ultimately leads to an increase in the general resistance of the body of chickens, increases the growth rate and safety of the bird.

In this regard, the use of acidifiers in poultry farming is promising.

Analysis of recent researches and publications.

In recent years, a number of studies have been carried out on the use of organic acids in poultry farming as feed acidifiers. One of the main conditions for the use of organic acids is a high degree of electrolytic dissociation and is typical for the environment of the digestive tract [3]. Among such acids, lactic acid has a high positive effect, which has received a wide range of applications not only as an acidifier, flavor enhancer and preservative, but also as a natural stimulator of animal productivity, a promoter of intestinal villi development, a disinfectant, a treatment agent, and others.

It was revealed that lactic acid, being an important intermediate product of metabolism in living organisms and possessing antimicrobial properties, in comparison with other organic acids, has significant advantages, since the direct action of the metabolite on the hypothalamus and pituitary gland is not excluded by the type of hormones and adaptogens.

The introduction of 3 to 5 kilograms of a 4% aqueous solution of lactic acid in compound feed for laying hens in the initial phase of laying significantly stimulates the formation of follicles in them, an increase in resistance.

It was found that the consumption of compound feed by young quail in the period from 1 to 49 days with a lactic acid content of 0.5 milliliters / 100 grams contributes to an increase in live weight by 9% ($P \leq 0.05$), average daily gains by 8.8% ($p \leq 0.05$). Feeding compound feed for young quail in the period from 1 to 49 days with a content of 0.3 and 0.5 milliliters / 100 grams of lactic acid helps to reduce feed costs per 1 kg of live weight gain by 2.4 and 0.6%, respectively [8].

Today, among the most famous acidifiers used in the production of compound feeds are Biotronic, Ultracid, Salmo-Mil, CuxAcid, Biatsid, Asid Lak. Biotronic is a line of acidifying products for pig and poultry farming of the company "Biomin GmbH" (Austria). Biotronic SE Forte, Biotronic SE Multi differ in the content of acids, salts, specific extracts, organic (oligosaccharides) and inorganic (silicon and its compounds)

carriers. Biotronic products maintain the pH in the small intestine at an optimal level (pH 5.5-6.2), inhibit the growth of pathogenic bacteria and promote the growth of beneficial intestinal microflora, that is, they contribute to ensuring microbial balance in the gastrointestinal tract. Biotronic SE Forte is a free-flowing powder, gray-brown in color with a bulk density of 400 grams / dm³. The pH of a 10% hydrogen solution is 3.6. The drug is intended for use in compound feed for pigs and poultry in the amount of 1-5 kilograms per 1 ton. The shelf life is 18 months [6]. As evidenced by the results of studies by foreign authors [8, 9], the use of organic acids in feeding improves the digestibility and assimilation of nutrients, increases the productivity of animals and reduces feed costs for products. The antioxidant and neurotropic effect of organic acids in the body of animals and their normalizing effect on energy metabolism, biosynthesis processes and general physiological state have also been proven [10, 11]. The company "NUTRI-AD" (Belgium) produces acidulants based on organic and inorganic acids under the trademarks Ultrasid, Salmo-Mil. Acidifiers are produced using various technologies, such as spraying-drying, sawing-cooling (coating), on carriers, in liquid form. Ultrasid V and Ultrasid 8Plus Dry are buffer acidifiers made using the Spray Dry technology and contain 20% of easily assimilable calcium. They are non-reactive, therefore, they are introduced into the composition of feed through premixes. Recently, in poultry feeding, drugs that are derived from yeast have been used, in particular the drug NuPro - a nucleoprotein containing nucleotides - the most important components of DNA, biotin, inositol (vitamin B8), essential amino acids, macro- and microelements, increases the energy of growth and development of the body young animals and poultry. (Dyachenko).

The research results showed that with the content of 1-3% of the mass fraction of NuPro in the mixed feed, the average daily body weight gain for 1 week of rearing in chickens 2, 3, 4 of the research groups was 6.8; 8.7; 7.3% higher, and for the entire experience,

broilers of the experimental groups in average daily gains were ahead of the control peers by 3.5-9.2%, and their feed costs per 1 kilogram of gain were less than that of the control group by 1.10-2, 21%.

The purpose of the research and methods. The purpose of the research was to study the effect of the acidifier "Ronocid" on the productivity, slaughter and hematological parameters of broiler chickens. The feed acidifier Ronocid is a product of a perfect combination of organic acids and salts of fatty acids, specially selected for effective action in every part of the gastrointestinal tract of animals. It is a gray powder. It contains organic acids: orthophosphoric, formic, lactic, succinic, fumaric, acetic, benzoic; as well as natural aluminosilicate and oregano essential oil. The supplier of this additive is a private company "Ukrfid". The product reduces the Ph of the digestive tract, has a pronounced antibacterial activity. Penetrating through the bacterial cell wall, the active substance disrupts metabolism and the regulation of internal processes in the cell, as a result of which the bacterial cell dies. In addition, its pharmacological properties are adsorption properties and additional enrichment with minerals, especially easily assimilated phosphorus.

The object of the research- broiler chickens of the Ross-308 cross. *The subject of the research* - productivity, lethality, broiler blood. The study was carried out at the Rodina farm in the Ilyinets district. The scientific and economic experience lasted 42 days and consisted of two periods: an equalizing one, lasting 7 days, accounting for 35 days (Table 1).

According to the principle of analogous groups, 100 heads of broiler chickens were selected and 2 groups of 50 heads each were created. The bird was kept in cages under microclimate conditions [11]. During the experiment, broilers were fed complete feeds of the Multigein trademark. The experimental group with the main diet - complete feeds consumed the acidifier "Ronocid" in the amount of 1.0 kilograms per ton of compound feed.

Table 1

Scheme of scientific - husbandry experience

Group	Duration of the period, days		Quantity chickens.	Feeding features
	equalizing	the main		
1- control	7	35	50	OR (complete feed)
2- control	7	35	50	OR + "Ronocid" 1.0 kilograms / ton of feed

During the experiment, the safety of the livestock, the live weight of broiler chickens, the feed consumption were taken into account, the absolute, average daily and relative gains in the live weight were calculated, and the slaughter indicators were determined.

Statistical processing of research data was calculated on a computer using the Microsoft Excel software. At the same time, the results of the average statistical data were considered reliable at * P < 0.05; ** P < 0.01; *** P < 0.001.

Research results and their discussion. According to the results of the experiment, it was revealed that

broiler chickens of the 2nd group, which were fed the acidifier "Ronocid" with mixed fodder, had higher growth and safety indicators (Table 2).

Thus, it was found that at 35 days of age the bird of the 2nd research group prevailed over its peers from the control group in terms of live weight by 82.1 grams or 4.3% (P < 0.01).

With age, the growth rate of broiler chickens in the experimental group increased relative to the control. In particular, at the end of rearing (6 weeks of age), the average weight of broiler chickens receiving the acidifier was 224.8 or 9.1% more (P < 0.001).

Table 2

Dynamics of live weight and safety of broilers, g ($M \pm m$, n = 20)

Chicks age, days	Group	
	1- control	2- research
1	42,8 ± 0,52	42,7 ± 0,68
7	175,6 ± 2,74	178,4 ± 2,82
14	427,5 ± 5,65	430,6 ± 6,47
21	832,2 ± 8,42	856,8 ± 10,64
28	1284,5 ± 13,53	1322,6 ± 14,72
35	1925,7 ± 19,45	2007,8 ± 18,65**
42	2461,5 ± 21,76	2686,3 ± 19,48***
safety, %	94	98

It should be noted that the safety of the poultry of the 2 group was higher by 4.0% compared to the control.

It was revealed that in broiler chickens aged 36-42

days for the consumption of the feed acidifier, the average daily gain was 96.9 grams, which is 20.4 grams because 26.7% more ($P < 0.05$) compared to the control (Table . 3).

Table 3

Average daily gain of broiler chickens, g ($M \pm m$, n = 20)

Chicks age, days	Group	
	1- control	1- research
1-7	19,1 ± 1,23	19,4 ± 1,34
8-14	36,0 ± 1,56	36,0 ± 1,45
15-21	57,8 ± 2,68	60,9 ± 2,54
22-28	64,6 ± 4,85	66,5 ± 4,72
29-35	71,6 ± 5,43	97,9 ± 5,84
36-42	76,5 ± 5,62	96,9 ± 5,56*
Average	54,3 ± 4,23	62,9 ± 5,45

On average, the average daily growth of poultry of the 2nd group was more by 8.6 grams or 15.8% relative to the control. The absolute gain in broiler chickens of the 2nd group at 15-21 days of age increased versus control peers by 5.3% ($P < 0.05$) (Table 4).

Consumption of the feed additive "Ronocid" allows increasing the absolute growth of broiler chickens

at the age of 22-28 days - by 3.1%, 29-35 days - by 6.9% ($P < 0.001$), and at the age of 36-42 days - by 26.5% compared to control.

On average, over the entire period of growing research broiler chickens, there is an increase in absolute growth by 9.3% ($P < 0.001$) relative to control analogs.

Table 4

The absolute growth of broiler chickens, g ($M \pm m$, n = 20)

Chicks age, days	Group	
	1- control	2- research
1-7	133,0 ± 2,75	136,0 ± 2,63
8-14	252,0 ± 2,52	252,0 ± 2,48
15-21	405,0 ± 5,46	426,6 ± 7,54*
22-28	452,0 ± 8,35	466,0 ± 11,62
29-35	641,2 ± 13,43	685,2 ± 14,85*
36-42	535,8 ± 21,55	678,5 ± 19,20***
Over the entire period of experience	2418,7 ± 28,62	2643,6 ± 25,46***

Young poultry grows unevenly, therefore, the absolute growth rate does not reflect the actual intensity of growth processes, the degree of relationship between the amount of body weight that increases and the growth rate. For this purpose, the relative gain is determined, which shows the percentage increase in body

weight at the end of the period relative to the body weight at the beginning of the period.

The additional use of an acidifier in poultry feeding also had a positive effect on the relative gains of broiler chickens (Table 5).

Table 5

The relative growth of broiler chickens,% (M ± m, n = 20)

Chicks age, days	Group	
	1- control	2- research
1-7	310,3 ± 3,85	317,8 ± 4,62
8-14	143,5 ± 2,56	141,4 ± 2,71
15-21	94,6 ± 2,82	98,9 ± 2,64
22-28	54,3 ± 1,35	54,4 ± 1,52
29-35	49,9 ± 1,63	51,8 ± 1,35
36-42	27,8 ± 1,28	33,8 ± 1,46*

It was revealed that at the age of 36-42 days, the relative growth of broiler chickens of the 2nd group, which received the feed acidifier, prevailed in control analogues by 6.0% (P <0.05). It has been proven that

feeding broiler chickens with the acidifier "Ronocid" has a positive effect on feed costs per unit of gain (Table 6).

Table 6

Efficiency of feed use, kilograms

Group	Feed costs, kilogram		
	over the period of experience	one head	per 1 kilogram gain
1- control	225,5	4,51	1,86
2- research	219,5	4,39	1,63

It was revealed that the cost of feed per 1 kilogram of poultry growth in the group was 0.23 kilograms or 12.4% less than in the control group. According to the results of the slaughter, it was found that additional

feeding of the biologically active additive "Ronocid" contributes to an increase in the slaughter performance of broiler chickens (Table 7).

Table 7

Slaughter qualities of broiler chickens, g (M ± m, n = 4)

Index	Group	
	1- control	2- research
Pre-slaughter live weight	2450,2 ± 44,15	2680,0 ± 41,15**
The mass of unpeeled carcass	2326,4 ± 37,28	2468,5 ± 34,45*
Weight of half-gutted carcass	1885,1 ± 31,72	2075,4 ± 32,84**
The weight of the gutted carcass	1628,0 ± 29,48	1796,2 ± 30,18**
Chest muscle mass	486,0 ± 18,57	554,0 ± 20,15*
Thigh muscle mass	315,0 ± 15,48	366,0 ± 17,37

The use of an acidifier in feeding broiler chickens increases their pre-slaughter live weight by 9.3% (P <0.01), the weight of a whole carcass by 6.1% (P <0.05), a half-gutted carcass by 10.0% (P <0.01) and gutted carcasses by 10.3% (P <0.01) relative to control analogues.

In addition, for the action of the feed additive, the mass of the chest muscles is 13.9% (P <0.05) and the

mass of the femoral muscles is 16.2% higher, against the control indicators.

The use of the acidifier "Ronocid" did not affect the morphological changes in the internal organs of the research bird (Table 8). No significant difference in the mass of the muscular and glandular stomachs, heart, lungs, liver, pancreas, spleen and kidneys was found.

Table 8

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

Index	Group	
	1- control	2- research
Glandular stomach	8,0 ± 0,64	8,1 ± 0,85
Muscular stomach	29,5 ± 1,28	32,2 ± 1,12
Heart	13,2 ± 1,52	13,8 ± 1,74
Lungs	12,1 ± 0,86	12,5 ± 0,92
Liver	37,3 ± 2,18	38,6 ± 4,25
Pancreas	4,6 ± 0,48	4,9 ± 0,52
Spleen	2,3 ± 0,22	2,5 ± 0,28
Kidneys	16,5 ± 1,04	17,1 ± 1,12

The control slaughter, carried out after the completion of the scientific and husbandry experiment, showed that the use of the acidifier "Ronocid" influenced the slaughter performance of broiler chickens in the control and experimental groups (Table 9).

In broiler chickens of the experimental group, the yield of semi-gutted and gutted carcasses was greater relative to the control group by 0.5 and 0.6%, however, no statistically significant difference was found for this indicator.

Table 9

Index	Slaughter products yield,% (M ± m, n = 4)	
	Group	
	1- control	1- control
Half-gutted carcasses	76,9 ± 4,92	77,4 ± 6,88
Gutted carcass	66,4 ± 5,84	67,0 ± 4,33
Pectoral muscles	19,8 ± 1,34	20,6 ± 1,45
Thigh muscles	12,9 ± 1,25	13,6 ± 1,32
Glandular stomach	0,3 ± 0,14	0,3 ± 0,15
Muscular stomach	1,2 ± 0,21	1,9 ± 0,92
Liver	1,5 ± 0,18	1,4 ± 0,54
Heart	0,53 ± 0,042	0,51 ± 0,028

When analyzing the mass of edible parts, there was a tendency to an increase in the mass of the pectoral and femoral muscles and the glandular stomach in the experimental group. In broiler chickens of the 2 group, the weight of edible parts prevailed in their weight in the control analogues, but there was no significant difference in these indicators.

One of the main indicators of metabolism and the physiological state of the body is the morphological and biochemical blood test. Therefore, during the experiment, the hematological parameters of the bird were studied (Table 10).

It was found that in broiler chickens of the 2 group, which received the acidifier "Ronocid" with the mixed

feed, the number of erythrocytes significantly increased by 10.0% (P <0.05) and hemoglobin by 7.5 (P <0.05) compared with the control. ... An increase in the hemoglobin content is positive and indicates an increase in redox processes and an intensification of metabolic processes in the body of chickens.

In terms of the content of total protein, albumin and globulins, there was no significant difference between the groups. In the blood of group 2 broilers, there was only a tendency to increase the total protein content by 4.9%, albumin by 7.8% and globulins by 2.3%. The biochemical parameters of the blood of broiler chickens were within the physiological norm.

Table 10

Index	Morphological and biochemical parameters of blood (M ± m, n = 4)	
	Group	
	1- control	1- control
Erythrocytes (t / l)	43,0 ± 0,05	43,3 ± 0,04*
Leukocytes (g / l)	420,2 ± 0,76	422,4 ± 1,18
Hemoglobin (g / l)	4110,2 ± 2,42	4118,5 ± 2,25*
Total protein, g / l	432,5 ± 2,54	434,1 ± 2,48
Albumin, g / l	415,3 ± 1,38	416,5 ± 1,25
Globulins, g / l	417,2 ± 1,52	417,6 ± 1,64
ALT, units / L	44,9 ± 1,84	45,1 ± 1,25
AsAT, units / L	4214,2 ± 26,15	4221,2 ± 32,26
Bilirubin, μmol / l	42,8 ± 0,64	43,0 ± 0,82
Cholesterol, mmol / l	42,3 ± 0,27	42,1 ± 0,25
Glucose, mmol / l	47,2 ± 0,68	47,4 ± 0,54
Calcium, mmol / l	42,2 ± 0,34	42,3 ± 0,42
Phosphorus, mmol / l	42,0 ± 0,36	42,2 ± 0,28

The levels of cholesterol, bilirubin, glucose, calcium and phosphorus in the blood were at the level of values of broiler chickens in the control group.

Conclusions. 1. It was found that when using the feed acidifier "Ronocid" the live weight of broiler chickens increased by 9.1% (P <0.001).

2. It was found that for the consumption of the investigated factor in broiler chickens, the average daily gain increased by 15.8% (P <0.05), absolute by 9.3% (P <0.001) relative to control analogues.

3. When using the acidifier "Ronocid" there is a decrease in feed costs per 1 kg of gain in group 2 by 0.23 kg or 12.4%.

4. The introduction of the acidifier "Ronocid" into the composition of the broiler chicken feed contributes to an increase in the pre-slaughter live weight by 9.3% (P <0.01), the weight of the whole carcass by 6.1% (P

<0.05), half-gutted - by 10.0% (P <0.01), gutted - by 10.3% (P <0.01), pectoral muscle mass - by 13.9% (P <0.05), femoral muscles - by 16, 2%.

5. The use of the acidifier "Ronocid" increases the hemoglobin content in the blood of broiler chickens by 7.5%, the number of erythrocytes - by 10.0%. Changes in blood parameters occurred within the range of physiological values for poultry.

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