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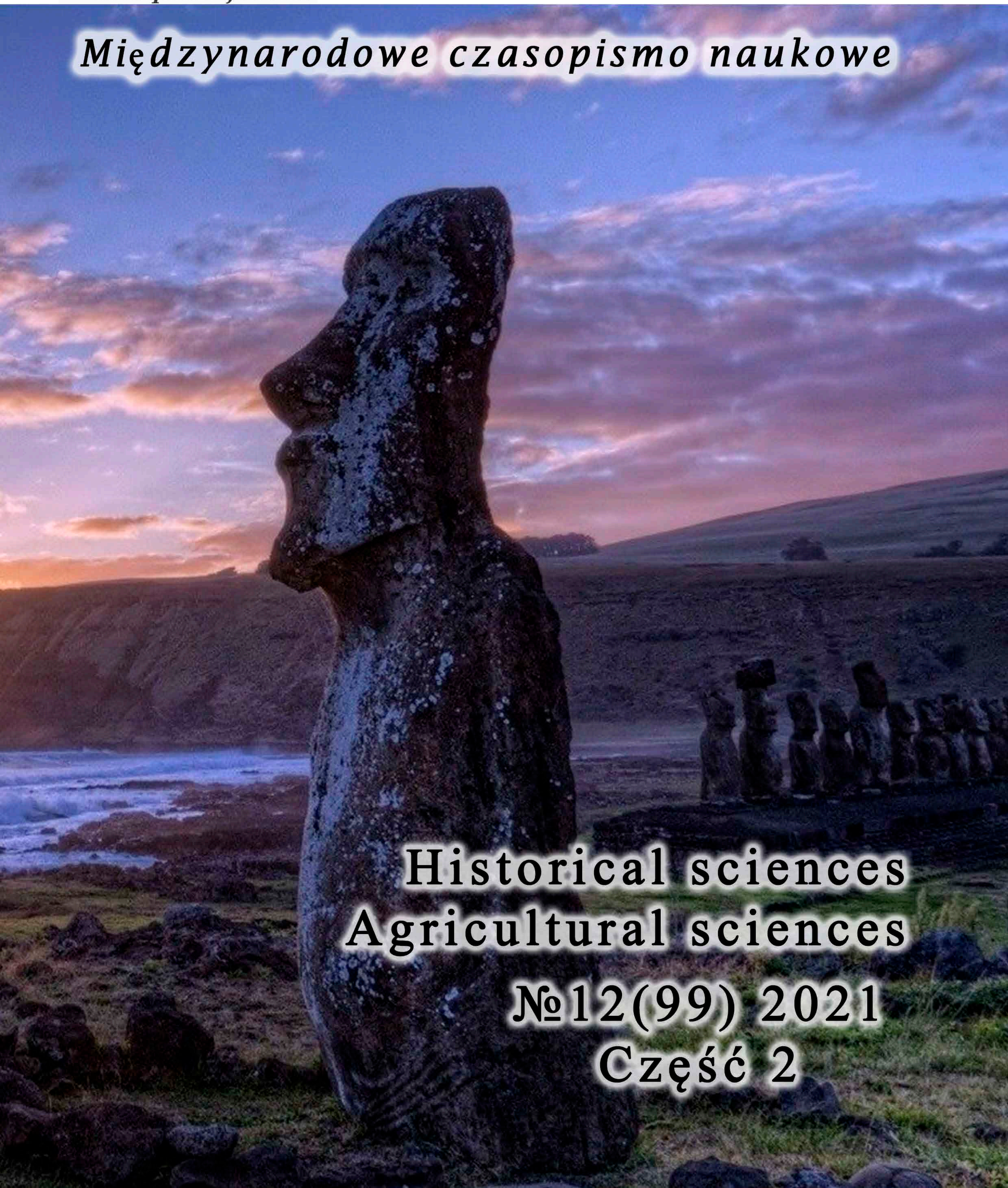

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THE INFLUENCE OF BIO-ORGANIC GROWING TECHNOLOGY ON THE PRODUCTIVITY OF LEGUMINS

Abstract.
The article provides information about the current state of grain production from legumes. Data on the dynamics of their sown areas and yield levels are summarized. Also scientifically substantiated results of the analysis of varietal resources and productivity of the studied phytocenoses according to their agroecological plasticity and grain productivity in the conditions of climate change in the zone of the right-bank Forest-steppe of Ukraine. The most promising varieties by maturity group, yield level are determined. Therefore, the most productive varieties were identified. Various technological aspects of cultivation have been studied in order to ensure the rational use of natural potential, which will further contribute to the expansion of sown areas of these plants. The relevance of the research is justified by the objectives of applied research on the basis of research sites of Vinnytsia National Agrarian University ("Development of methods for improving the technology of growing legumes using biofertilizers, bacterial preparations, foliar fertilizers and physiologically active substances"). The introduction into production practice of highly productive varieties of legumes will reduce the deficit of vegetable protein, as well as improve the physico-chemical and phytosanitary conditions of the soil.

Keywords: *legumes, cultivation technology, cultivation zone, agroclimatic potential, climate change.*

Formulation of the problem.Strategically, Ukraine should take a course to reduce the export of raw materials and create conditions for the organization of in-depth processing, which will contribute to: meeting the needs of intensive animal husbandry with high-protein feed; creation of additional jobs; increase in tax revenues; ensuring food and environmental security of Ukraine. Intensification of fodder grain production should become one of the strategic directions of accelerated development of all agro-industrial production of Ukraine by 2030. For this purpose it is necessary to focus on creation of high-yielding varieties their cultivation, which will be based on the effective use of life factors (light, heat, moisture, nutrients), which will promote maximum synthesis of organic matter and protein. In addition, in the context of climate change, it will be necessary to form a common agricultural policy for the production of high-protein crops with the EU. This is an urgent and important task, the solution of which will be a significant contribution to solving the problem of vegetable protein, the formation of its own protein resources, increasing soil fertility and strengthening the economy of Ukraine. Therefore, the leading role in solving these issues is given to legumes.

Legumes occupy an exceptional place in the grain and fodder balance of agricultural formations of Ukraine. Their grain and green mass in terms of protein content exceeds cereals more than twice, in terms of amino acid composition their proteins are much better digested, give the cheapest protein, include in the biological cycle nitrogen air, which is not available for other crops.

Analysis of recent research and publications. Scientific the basics of the development of legume production are revealed in the works of many domestic and foreign authors. O. Babych, V. Petrychenko, V. Kaminsky, M. Bakhmat, V. Mazur, H. Pantsyreva, O. Tkachuk, N. Telecalo devoted to the study of technological methods of growing legumes. Economists G. Kaletnyk, I. Goncharuk, K. Mazur, V. Andriychuk, I. Balanyuk, V. Blagodatny, O. Borodina, O. Garkusha, V. Geyts, G. Zhuikov, V. Zlenko, I. Irtyscheva, Y. Kernasyuk, and other scientists. They laid scientific advances on the theoretical, methodological, methodological and instrumental provisions of grain production.

Presenting main material. Field experiments were conducted during 2016-2018 on the basis of the Research Farm «Agronomiche» of Vinnytsia National Agrarian University in the village of Agronomichne of Vinnytsia district of Vinnytsia region. The territory of the right-bank Forest-Steppe of Ukraine, the place of research, is characterized by a favorable agro-climatic potential for growing most crops, including legumes. In particular, there are sufficient amounts of active air temperatures and rainfall per year and their distribution over the growing season. However, the real bioclimatic resources of the region are not enough to better realize the productivity potential of legumes. Therefore, there is a need to develop new and improve existing models of technologies for growing legumes. Clarification of these issues is relevant and requires detailed studies, especially on the development of zonal cultivation technologies, which take into account the specifics of soil and climatic potential of the growing region.

Results. The results of research indicate a significant impact of the studied technological methods of cultivation on the level of yield of legumes (Table 1).

Table 1

Grain yield of legumes depending on technological methods of cultivation, t / ha (average for 2016-2018)

№	Culture	Variety	Pre-sowing seed treatment	Retardant concentration,%	Yield, t / ha	Increase from p.s.t., t / ha	Increase from the concentration of the retardant, t / ha
1	Sowing peas	Tsarevych	without p.s.t.	without treatment (C)	2,05	-	-
				0,5	2,14	-	0,1
			Rhyzogumin	0,75	2,53	-	0,5
				1	2,46	-	0,4
		Prystan	without p.s.t.	without treatment	2,15	0,1	-
				0,5	2,25	0,2	0,2
			Rhyzogumin	0,75	2,65	0,6	0,5
				1	2,54	0,5	0,4
2	White lupine	Veresnevyi	without p.s.t.	without treatment (C)	2,74	-	-
				0,5	2,94	-	0,2
			Rhyzogumin	0,75	3,33	-	0,6
				1	3,07	-	0,3
		Chabanskyi	without p.s.t.	without treatment	2,88	0,1	-
				0,5	3,05	0,3	0,2
			Rhyzogumin	0,75	3,44	0,7	0,6
				1	3,22	0,5	0,4
3	Lupine narrow-leaved	Olimp	without p.s.t.	without treatment (C)	2,04	-	-
				0,5	2,26	-	0,2
			Rhyzogumin	0,75	2,57	-	0,5
				1	2,48	-	0,4
		Peremojets	without p.s.t.	without treatment	2,18	0,1	-
				0,5	2,35	0,3	0,2
			Rhyzogumin	0,75	2,60	0,6	0,5
				1	2,52	0,5	0,4
4	Chickpeas	Pegas	without p.s.t.	without treatment (C)	2,11	-	-
				0,5	2,45	-	0,3
			Rhyzogumin	0,75	2,85	-	0,7
				1	2,74	-	0,6
		Skarb	without p.s.t.	without treatment	2,25	0,1	-
				0,5	2,64	0,5	0,4
			Rhyzogumin	0,75	3,08	0,9	0,8
				1	2,9	0,8	0,7
5	Soybean	Holubka	without p.s.t.	without treatment (C)	3,04	-	-
				0,5	3,23	-	0,2
			Rhyzogumin	0,75	3,42	-	0,4
				1	3,31	-	0,3
		Azymut	without p.s.t.	without treatment	3,12	0,1	-
				0,5	3,43	0,3	0,3
			Rhyzogumin	0,75	3,66	0,5	0,5
				1	3,55	0,4	0,4

$HIP_{0,05}$ т/га (sowing peas): A-0,07; B-0,10; C-0,08; AB-0,14; AC-0,12; BC-0,17; ABC-0,24
2016 $HIP_{0,05}$ t/ha: A-0,04; B-0,05; C-0,04; AB-0,07; AC-0,06; BC-0,08; ABC-0,12
2017 $HIP_{0,05}$ t/ha: A-0,05; B-0,06; C-0,06; AB-0,04; AC-0,08; BC-0,11; ABC-0,16
2018 $HIP_{0,05}$ t/ha: A-0,04; B-0,06; C-0,05; AB-0,04; AC-0,07; BC-0,10; ABC-0,14
$HIP_{0,05}$ т/га (white lupine): A-0,05; B-0,08; C-0,06; AB-0,12; AC-0,10; BC-0,15; ABC-0,04
2016 $HIP_{0,05}$ t/ha: A-0,03; B-0,04; C-0,03; AB-0,06; AC-0,05; BC-0,07; ABC-0,10
2017 $HIP_{0,05}$ t/ha: A-0,04; B-0,07; C-0,07; AB-0,10; AC-0,07; BC-0,12; ABC-0,15
2018 $HIP_{0,05}$ t/ha: A-0,05; B-0,05; C-0,04; AB-0,07; AC-0,06; BC-0,11; ABC-0,13
$HIP_{0,05}$ т/га (lupine narrow-leaved): A-0,05; B-0,08; C-0,06; AB-0,12; AC-0,10; BC-0,14; ABC-0,09
2016 $HIP_{0,05}$ t/ha: A-0,03; B-0,04; C-0,03; AB-0,05; AC-0,04; BC-0,08; ABC-0,10
2017 $HIP_{0,05}$ t/ha: A-0,04; B-0,05; C-0,05; AB-0,06; AC-0,06; BC-0,09; ABC-0,12
2018 $HIP_{0,05}$ t/ha: A-0,04; B-0,06; C-0,05; AB-0,07; AC-0,07; BC-0,08; ABC-0,13
$HIP_{0,05}$ т/га (chickpeas): A-0,04; B-0,07; C-0,08; AB-0,06; AC-0,09; BC-0,2 ABC-0,08
2016 $HIP_{0,05}$ t/ha: A-0,05; B-0,04; C-0,03; AB-0,05; AC-0,04; BC-0,07; ABC-0,09
2017 $HIP_{0,05}$ t/ha: A-0,06; B-0,05; C-0,05; AB-0,06; AC-0,08; BC-0,08; ABC-0,10
2018 $HIP_{0,05}$ t/ha: A-0,07; B-0,04; C-0,02; AB-0,08; AC-0,03; BC-0,04; ABC-0,13.
$HIP_{0,05}$ т/га (soybean): A-0,02; B-0,03; C-0,03; AB-0,02; AC-0,04; BC-0,14; ABC-0,05
2016 $HIP_{0,05}$ t/ha: A-0,02; B-0,03; C-0,03; AB-0,02; AC-0,02; BC-0,02; ABC-0,05
2017 $HIP_{0,05}$ t/ha: A-0,02; B-0,01; C-0,02; AB-0,03; AC-0,03; BC-0,03; ABC-0,06
2018 $HIP_{0,05}$ t/ha: A-0,03; B-0,02; C-0,03; AB-0,03; AC-0,02; BC-0,02; ABC-0,03

Field studies have established the maximum grain yield in legume varieties. Thus, in sowing peas the most productive variety was Prystan (2.6 t / ha), white lupine – Chabanskyi (3.4 t / ha), narrow-leaved lupine – Peremozhets (2.6 t / ha), chickpea – Skarb (3.0 t / ha) and in soybeans – Azimuth (2.6 t / ha). Therefore, the maximum yield increments were obtained by treating the seeds with the bacterial preparation Rhizohumin and spraying the crops with chlormequat chloride retardant in the budding phase.

As a result of the conducted researches it is established that with increase of grain productivity the yield of crude protein also increased (table 2).

Table 2

Content and yield of crude grain protein of legumes depending on technological methods of cultivation, t / ha (average for 2016-2018).

№	Culture	Variety	Pre-sowing seed treatment	Retardant concentration,%	Crude protein,%	Yield of crude protein, t / ha
1	Sowing peas	Tsarevych	without p.s.t.	without treatment (C)	19,8	0,40
				0,5	20,2	0,42
			Rhyzogumin	0,75	21,3	0,53
				1	20,7	0,49
		Prystan	without p.s.t.	without treatment	21,0	0,44
				0,5	21,5	0,47
			Rhyzogumin	0,75	22,8	0,59
				1	22,1	0,55
2	White lupine	Veresnevyi	without p.s.t.	without treatment (C)	34,6	0,93
				0,5	35,1	1,02
			Rhyzogumin	0,75	36,3	1,20
				1	35,8	1,07
		Chabanskyi	without p.s.t.	without treatment	36,1	1,01
				0,5	36,5	1,09
			Rhyzogumin	0,75	38,2	1,30
				1	37,2	1,19
3	Lupine narrow-leaved	Olimp	without p.s.t.	without treatment (C)	30,7	0,61
				0,5	31,1	0,68
			Rhyzogumin	0,75	32,0	0,80
				1	31,5	0,75
		Peremojets	without p.s.t.	without treatment	31,7	0,67
				0,5	32,3	0,74
			Rhyzogumin	0,75	33,5	0,87
				1	32,8	0,82
4	Chickpeas	Pegas	without p.s.t.	without treatment (C)	24,8	0,52
				0,5	25,2	0,60
			Rhyzogumin	0,75	26,2	0,73
				1	25,7	0,69
		Skarb	without p.s.t.	without treatment	26,1	0,57
				0,5	26,4	0,67
			Rhyzogumin	0,75	27,5	0,82
				1	27,0	0,78
5	Soybean	Holubka	without p.s.t.	without treatment (C)	33,3	0,67
				0,5	34,2	0,75
			Rhyzogumin	0,75	36,2	0,87
				1	35,4	0,81
		Azymut	without p.s.t.	without treatment	34,2	0,72
				0,5	35,6	0,85
			Rhyzogumin	0,75	37,8	0,98
				1	36,1	0,90

The maximum yields of crude protein per unit area were obtained by treating the seeds with the bacterial preparation Rhizohumin and spraying the crops with chlormequat chloride retardant in the budding phase. Due to the increase in yield, the highest yield of crude protein (0.93 – 1.19 t / ha) was in white lupine plants. Thus, in pea sowing the yield of crude protein was the highest in the variety Prystan (0.59 t / ha), white lupine – Chabanskyi (1.19 t / ha), narrow-leaved lupine – Peremozhets (0.87 t / ha), chickpeas – Skarb (0.82 t / ha) and in soybeans – Azimuth (0.98 t / ha).

Conclusions. Our improved model of bioorganic varietal technology for growing legumes using the proposed bioorganic and technological measures will increase the production of quality grain of the studied crops, increase the total harvest of crude protein and increase the level of biological nitrogen fixation in the Forest-Steppe Right Bank.

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PRODUCTIVITY OF LAYING HENS FED BY FEED ADDITIVES

Abstract.

The aim of the experiment was to research the effect of the enzyme additive AlfaGal on egg-laying ability and egg quality of laying hens. It was found that the average daily, absolute and relative gains increased by 9.9% (P≤0.05), 10%, respectively, and 3.2% for poultry fed by the feed additive than control counterparts.

The AlfaGal enzyme additive application for laying hens feeding increases the gross collection of eggs by 6.2% (P≤0.05) compared with control counterparts.

The enzyme additives application in the experimental poultry feeding reduces feed costs by 10 eggs by 5.5% compared to the control.

Using an enzyme additive for laying hens feeding increases the weight of the egg by 7.6% (P≤0.05).

Egg white weight increases by 5.4% (P≤0.05) in the second experimental group under the action of AlfaGal.

Keywords: laying hens, enzyme preparation, feed, eggs.

INTRODUCTION

Today, it is common practice to use enzymes to increase the nutritional value of the diet and the nutrient composition variability of such feed components as phytase, enzymes [4, 7, 10].

There are many manufacturers and suppliers of feed enzymes on the market today, so the feeding specialist has a huge range to choose from. However, there is a significant problem in finding effective drugs [1, 3, 6].

Enzymes have a different mechanism of action on the body of animals than hormones and biostimulants. They are not accumulated in the animal body and livestock products as a part of the final products. Animals and poultry produce their own enzymes in the digestive tract they are the hydrolysis of feed nutrients. Adult animals can digest up to 60-70% of feed nutrients, although the digestive glands produce sufficient amounts of pepsin, trypsin, amylase, lipase and other digestive enzymes. It is known that young animals are born with an underdeveloped digestive enzyme system [2, 12].

Poultry is one of the important and promising branches of animal husbandry, it has low labor and feed costs receiving a significant amount of valuable dietary foods for humans. Providing the population in food and industry in raw materials can be achieved due to the proportional development of agricultural industries, including poultry.To increase the efficiency of feed use is one of the important tasks facing poultry farming [6, 11].

Therefore, the aim of the experiment was to research the effect of the AlfaGal enzyme additive on the laying ability and eggs quality of laying hens. Feed additive is aimed for use in feeding farm animals and poultry.

METHODS AND MATERIALS

The experiment was carried out using the method of analogue groups, it allows to determine the effect of the researched drug. Forming the groups, we took into account the live weight of animals, age, sex, breed, productivity, etc. [5].

The equalization period of the experiment lasted for 10 days, and the main period of the experiment lasted for 180 days. The poultry was kept in one tier group cages in compliance with zoohygienic requirements [5].

The control group consumed the basic diet (BD), i.e., complete feed. Experimental group was additionally fed by AlfaGal (0.1 kg per ton of feed).