

Ministry of Education and Science of Ukraine  
Sumy National Agrarian University  
Faculty of Veterinary Medicine  
Department of Virology, Pathantomy and Poultry Diseases named after Prof. Panikar I.I.

**Work program (syllabus) of the educational component  
Methodology of scientific research**

compulsory

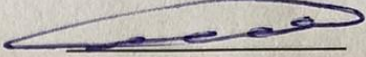
(compulsory/optional)

implemented in the “Veterinary medicine” Academic Program

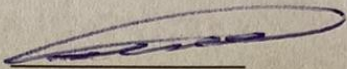
Area of specialization 211 -Veterinary medicine  
at the second (magister's) level of higher education

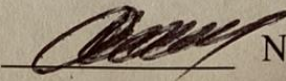
Sumy-2023

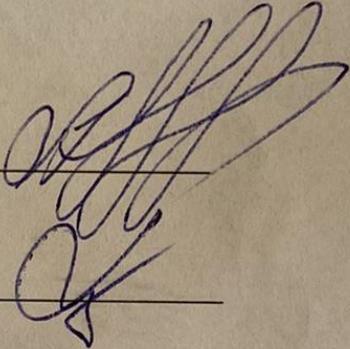
Author: Petrov R.V. PhD of Virology, Pathanatomy and Poultry Diseases Department, c. vet. med. Kisil D.O.

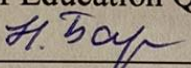
Module syllabus agreed at the of Virology, Pathanatomy and Poultry Diseases Department meeting	protocol dated May 19, 2023 No. 15
	Head Department, Professor <u></u> Petrov R.V.

Approved by:

Guarantor of the Academic program 

Dean of the Faculty  Nechiporenko O.L.

Syllabus review (attached) is provided by: 

Representative of the Department of Education Quality assurance,  
licensing and accreditation  (N. Baranik)

(підпис)

(ПІБ)

Registered in electronic data base 15.06. 2023

Syllabus review data:

The academic year in which changes are made	The Academic program attachment number with changes description	Changes revised and approved		
		Minutes No and date of the department meeting	Head of Department	Guarantor of the Academic program
2023-2024				

## 1. MODULE OVERVIEW

1.	Title	Research methodology			
2.	Faculty/Department	Faculty of Veterinary Medicine, Virology, Pathanatomy and Poultry Diseases after Prof. I.I. Panikar Department			
3.	Type (compulsory or optional)	compulsory			
4.	Program(s) to which module is attached (to be filled in for compulsory types)	OP Veterinary Medicine 211 - Veterinary medicine			
5.	Module can be suggested for (to be filled in for optional types)				
6.	Level of the National Qualifications Framework	7			
7.	Semester and duration of Module	9 semesters, 15 weeks			
8.	ECTS credits number	3			
9.	Total workload and time Allotment	Directed study		Self-directed study	
		Lectures	Practical	Labs	
		6		14	70
10.	Language of instruction	English			
11.	Module leader	PhD of Virology, Pathanatomy and Poultry Diseases Department, c. vet. med. Kisil D.O.			
11.1	Module leader contact Information	FVM, office 17, 0665433827, <a href="mailto:Dima_kisill@meta.ua">Dima_kisill@meta.ua</a> consultations every monday from 14-15 to 15-30			
12.	General description of the educational component	<p>Methodology comes from the Greek word “methoges” - knowledge and “logos” - teaching. Methodology is considered as a doctrine of scientific methods of cognition and as a system of scientific principles on which the study is based and the choice of cognitive tools, methods and techniques of research. Methodology is a set of rules for defining concepts, deriving some knowledge from others, methods, techniques, operations of scientific research in all fields of science and at all stages of research. Methodology is a separate scientific discipline that studies the technology of scientific research, description and analysis of stages of research; it is a doctrine of a system of scientific principles and methods of research. The methodology includes fundamental, general scientific principles that underlie it, specifically the scientific principles underlying the theory of a discipline or field of science, and a system of specific methods and techniques used to solve special research problems.</p>			
13.	The purpose of the educational component	<p>The main purpose of the methodology of science - the study and analysis of methods, tools, techniques by which to obtain new knowledge in science at both empirical and theoretical levels of knowledge. Methodology is a scheme, a plan for solving the tasks of scientific research.</p>			
14.	Prerequisites for studying	The educational component is based on the knowledge obtained in			

	OK, connection with other educational components of OP	the study of general biological, clinical disciplines, infectious diseases, methods of economic research.
15.	The policy of academic integrity	Attendance is mandatory, unacceptable delays, students must follow the rules of conduct in the classroom; You are not allowed to write off and use mobile phones while writing tests, taking tests and exams. Rearrangement of modules occurs for good reasons. Abstracts must have references to the literature used.
16	Course link in Moodle	<a href="https://cdn.snau.edu.ua/moodle/course/view.php?id=4266">https://cdn.snau.edu.ua/moodle/course/view.php?id=4266</a>

## 2. LEARNING RESULTS UNDER THE EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

MLOs: On successful completion of the module the learner will be able to:	PLOs							How assessed
	PLOs 1	PLOs 2	PLOs 5	PLOs 6	PLOs 11	PLOs 13	PLOs 18	
MLOs 1. Biological research methods in veterinary medicine.	+		+	+	+	+	+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>
MLOs 2. Bacteriological and mycological studies	+	+		+			+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>
MLOs 3. Immunological and virological methods in scientific research.	+	+		+			+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>
MLOs 4. Use of parasitological methods in scientific research.	+						+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>

MLOs 5. Use of biochemical methods in scientific research.	+	+					+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>
MLOs 6. Use of toxicological methods in scientific research.	+	+		+			+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>
MLOs 7. Використання гістологічних та гістохімічних методів в наукових дослідженнях.	+	+		+			+	<ul style="list-style-type: none"> <li>- survey of theoretical questions,</li> <li>- performance of tasks in laboratory-practical classes,</li> <li>- testing,</li> <li>- performance of tasks of independent work</li> </ul>

### 3. MODULE INDICATIVE CONTENT

Topics	Distribution of course			Learning resources
	Directed study		Self-directed study	
	Lectures	Labs		
<b>Topic 1. Biological research methods in veterinary medicine. Statistical method of evaluation of measurements.</b> Biometric processing of digital data results. Safety techniques and measures to prevent infection of people with pathogens. Research in vitro, in vivo. Research modeling.	2	2	10	3,5,8,12
<b>Topic 2. Bacteriological and mycological research.</b> Rules for organizing work in veterinary microbiological laboratories. Safety techniques and measures to prevent infection of people with pathogens. Sampling and transportation of material for microbiological, virological and serological studies. Techniques of cultivation of bacteria and fungi. Microscopic studies (in the dark field, phase-contrast and anoptral microscopy, luminescence, electron). Determination of sensitivity, resistance and tolerance of microorganisms to antibiotics and chemotherapeutic drugs by the method of serial dilutions, disk-		2	10	2,3,4,6,13

diffusion method, with the use of nutrient media. Methods of cultivation of aerobes, anaerobes, long-term storage of microorganisms. Biological samples; application of ELISA, PCR, RMA, RAD in the diagnosis of animal diseases.				
<b>Topic 3. Immunological and virological methods in scientific research.</b> The technique of isolation and cultivation of viruses on laboratory animals, in cell culture, chicken embryos; indication (finding) of viruses in cell culture; use of diagnostic immunological tests (RA, RAP, RNHA, RP, RDP, RID, RN, RHA, RTHA, RZK, methods of immunofluorescence, immunoelectrophoresis, radioimmunoassay, ELISA, PCR). The technique of material research in a phase-contrast, luminescence and electron microscope. List of infectious diseases included in the OIE list and diagnostic tests used in international trade. Principles of validation of diagnostic tests for infectious diseases. Application of ELISA in the diagnosis of animal diseases. The use of PCR in the diagnosis of animal diseases. The use of RAD in the diagnosis of bovine leukemia. The use of PMA in the diagnosis of leptospirosis.	2	2	10	9,10,11,13
<b>Topic 4. Use of parasitological methods in scientific research.</b> Determination of the intensity and extensiveness of the invasion. Immunobiological diagnosis of parasitic diseases. Special methods of animal parasitosis research.		2	10	8,6,12,14
<b>Topic 5. Use of biochemical methods in scientific research.</b> Determination of biochemical blood constants of various animal species. Determination of biochemical parameters of urine of various animals. Evaluation based on the results of biochemical studies of the general state of the body. Biochemical indicators of the functional state of the liver, kidneys, pancreas. Study of factors of non-specific resistance of the body. Study of cellular and humoral immunity.		2	10	1,12
<b>Topic 6. Use of toxicological methods in scientific research.</b> Determination of acute and chronic toxicity of medicinal products. Cumulative effect of drugs. Pharmacokinetics, biotransformation of drugs and animal intoxication.		2	10	5, 9,14

<p>Methods of determining the general toxicity of feed and feed additives. Determination of chronic toxicity of drugs: blood and hematopoiesis research; immunological indicators and tests. Study of toxicity when applied to the skin and determination of skin resorptive and local action. Pathomorphological studies for the study of various actions of medicines. Establishing the harmlessness of veterinary medicines and feed additives. Toxicological and biological studies to determine the toxicity of feed and feed additives. Cell culture is a biological model for toxicological control of veterinary drugs.</p> <p>Basic principles of drug and feed additive testing. Toxicological control of medicinal products using infusions. Detection of embryotoxicity and teratogenic effects of veterinary medicinal products. Research on the mutagenicity of veterinary medicinal products. Physico-chemical methods for determining mycotoxins. ELISA for determination of mycotoxicosis. Establishing the toxicity of vaccines, toxoids. Detection of allergic reaction and pyrogenicity to the effect of drugs. Control of microbial contamination of non-sterile dosage forms. Generalization on determining the harmlessness of veterinary drugs.</p>				
<p><b>Topic 7. Use of histological and histochemical methods in scientific research.</b> Histological, histochemical, immunohistochemical studies. Selection, fixation and forwarding of pathological material for histological studies; techniques for making paraffin and celluloid sections, their coloring and preservation; material fixation technique and preparation for histological and immunohistological studies; conservation and preservation of samples of biological material obtained as a result of experiments.</p>	2	2	10	11, 12,13
<b>Всього</b>	<b>6</b>	<b>14</b>	<b>70</b>	<b>90</b>

#### 4. TEACHING AND LEARNING METHODS

MLOs	Teaching methods (directed study)	Hours	Learning methods (self-directed study)	Hours
MLOs 1. Biological research methods in veterinary	<b>Teaching methods by source of knowledge:</b> <b>Verbal:</b> story, explanation, conversation (heuristic	2	<b>Learning methods by source of knowledge:</b> <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables,	10



<p>medicine.</p>	<p>and reproductive), lecture, instruction.  <b>Visual:</b> demonstration, illustration, observation.  <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests)  <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets.</p>		<p>graphs, supporting notes),  <b>Visual:</b> observation.  <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method).  <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies).  <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation)</p>	
<p>MLOs 2.  Bacteriological and mycological studies.</p>	<p><b>Teaching methods by source of knowledge:</b>  <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction.  <b>Visual:</b> demonstration, illustration, observation.  <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests)  <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets.</p>	<p>2</p>	<p><b>Learning methods by source of knowledge:</b>  <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes),  <b>Visual:</b> observation.  Teaching methods according to the nature of the logic of knowledge (analytical, synthesis methods, inductive method, deductive method, translational method).  <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies).  <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation)</p>	<p>10</p>
<p>MLOs 3.  Immunological and virological methods in scientific research.</p>	<p><b>Teaching methods by source of knowledge:</b>  <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction.  <b>Visual:</b> demonstration, illustration, observation.  <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests)  <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets.</p>	<p>2</p>	<p><b>Learning methods by source of knowledge:</b>  <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes),  <b>Visual:</b> observation.  <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method).  <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies).  <b>Interactive learning</b></p>	<p>10</p>

			<b>technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation)).	
MLOs 4. Special methods of animal parasitosis research.	<p><b>Teaching methods by source of knowledge:</b>  <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction.  <b>Visual:</b> demonstration, illustration, observation.  <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests)  <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets).</p>	2	<p><b>Learning methods by source of knowledge:</b>  <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes),  <b>Visual:</b> observation.  <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method).  <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies).  <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation))</p>	10
MLOs 5. Use of biochemical methods in scientific research.	<p><b>Teaching methods by source of knowledge:</b>  <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction.  <b>Visual:</b> demonstration, illustration, observation.  <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests)  <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets).</p>	2	<p><b>Learning methods by source of knowledge:</b>  <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes),  <b>Visual:</b> observation.  <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method).  <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies).  <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation))</p>	10

<p>MLOs 6. Use of toxicological methods in scientific research.</p>	<p><b>Teaching methods by source of knowledge:</b> <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction. <b>Visual:</b> demonstration, illustration, observation. <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests) <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets.</p>	2	<p><b>Learning methods by source of knowledge:</b> <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes), <b>Visual:</b> observation. <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method). <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies). <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation (cooperation)</p>	10
<p>MLOs 7. Use of histological and histochemical methods in scientific research.</p>	<p><b>Teaching methods by source of knowledge:</b> <b>Verbal:</b> story, explanation, conversation (heuristic and reproductive), lecture, instruction. <b>Visual:</b> demonstration, illustration, observation. <b>Active methods:</b> (use of technical teaching aids, use of educational and control tests) <b>Interactive teaching methods:</b> (use of multimedia technologies, spreadsheets.</p>	2	<p><b>Learning methods by source of knowledge:</b> <b>Verbal:</b> working with a book (reading, retelling, writing, taking notes, making tables, graphs, supporting notes), <b>Visual:</b> observation. <b>Teaching methods according to the nature of the logic of knowledge</b> (analytical, synthesis methods, inductive method, deductive method, translational method). <b>Active methods</b> (brainstorming, solving crosswords, debates, round tables, binary classes, business and role-playing games, group studies). <b>Interactive learning technologies</b> (use of multimedia technologies, dialogic learning, student cooperation.</p>	10

## 5. EVALUATION BY THE EDUCATIONAL COMPONENT

### 5.1. Diagnostic assessment (specified as necessary)

### 5.2. Summative assessment

#### 5.2.1. To assess the expected learning outcomes, it is provided

№	Methods of summative assessment	Points / Weight in the overall assessment	Compilation date
1.	Thematic survey; Execution of tasks in laboratory-practical classes; Computer testing (multiple choice) in Model (MLOs 1)	35 / 35 %	According to the schedule
2.	Thematic survey; Execution of tasks in laboratory-practical classes; computer testing (multiple choice) in Moodle (MLOs2)	35 / 35 %	According to the schedule
3.	Independent work (Report with a presentation on the subject of independent study of the discipline, computer testing in Moodle.	15/15%	During the semester

4.	Thematic survey; Execution of tasks in laboratory-practical Classes.	15/15%	9 week
5.	Sum	100/100%	

### 5.2.2. Grading criteria

<b>Summative assessment method</b>	<b>Unsatisfactory</b>	<b>Satisfactory</b>	<b>Good</b>	<b>Excellent</b>
Thematic survey	<i>9th semester &lt;20 points</i>	<i>22-25 points</i>	<i>25-30 points</i>	<i>35 points</i>
	The student can play only individual fragments of the course.	Most requirements are met, but some components are missing or insufficiently disclosed, there is no analysis of other approaches to the issue.	All requirements of the task are fulfilled.20	All the requirements of the task have been fulfilled, creativity and thoughtfulness have been demonstrated.
Execution of tasks in laboratory-practical classes	<i>9th semester &lt;20 points</i>	<i>22-25 points</i>	<i>25-30 points</i>	<i>35 points</i>
	Task requirements not met	Most of the tasks are performed using based on the basic theoretical provisions, but the student has difficulty explaining the solution of laboratory and practical problems.	The student has mastered the basic material, and understands and performs laboratory-practical tasks. Understands the main provisions that are decisive in the course, can solve similar problems by those discussed with the teacher, but allows a small number of inaccuracies.	The student implements the theoretical material of the discipline in the performance of laboratory and practical work, is able to analyze and compare the results based on the knowledge, skills, practical skills acquired in this discipline
Multiple choice test	<i>≤ 5 points</i>	<i>6–9 points</i>	<i>10–13 points</i>	<i>14–15 points</i>
	The student gives the correct answer to several questions (≤ 33% of the correct answers).	The student has some knowledge provided in the program of the discipline, has the basic provisions being studied and gives the correct answer to several questions (34-59% of correct answers).	The student is generally well versed in the material, knows the basic provisions of the material, and gives the correct answer to several questions (60-89% of the correct answers).	The student demonstrates complete and solid knowledge of the study material in the amount that corresponds to the program of the discipline, correctly answers the test questions (90-100% of the correct

Design and presentation report of independently processed material	$\leq 5$ points	6–9 points	10–13 points	14–15 points
	The student does not have a complete understanding of the material on the discipline. The student did not perform independent study of the material.	Despite the fact that the student completed the program of the discipline, but some components are missing or insufficiently developed, the student worked passively.	Knows the basic provisions that are crucial in	The student does not have a complete understanding of the material on the discipline. The student did not perform independent study of the material.

### 5.3. Formative assessment

Formative exercises are designed to enable students to develop particular aspects of their learning, prior to summative assessments. Formative exercises are designed to help students use feedback and self-reflection to manage and develop their learning so that they can see how to improve their work.

№	Formative Assessment elements	Date
1	Written survey after studying topics 2, 5, 8	During the lesson according to the schedule
2	Oral feedback while working on practical tasks	During the semester
3	Oral feedback from the teacher after the report with a presentation on the subject of independent study of the discipline	During the lesson

Self-assessment can be used as an element of summative assessment and formative assessment.

## 6. LEARNING RESOURCES (LITERACHA)

1. Erina A.M., Zakhovzhai V.B., Erin D.L. (2004). Research Methodology: Textbook. - Kyiv: Center for Educational Literature, 212 p.
2. Klimenko M.O., Petruk V.G., Mokin V.B., Voznyuk N.M. (2012). Methodology and organization of scientific research: Textbook. Kherson: Oldi-plus. 474 p.
3. Konversky A.E., Lubsky V.I., Gorbachenko T.G., Bugrov V.A., Kondratieva I.V., Rudenko O.V., Yushyn K.E. (2010). Fundamentals of methodology and organization of research: Teaching way. for students, cadets, graduate students and adjuncts. Kyiv: Center for Educational Literature. 352 p.
4. Krushelnytska O.V. (2009). Methodology and organization of scientific research: Textbook. - K.: Kondor. 206 c.
5. Stechenko D.M., Chmir O.S. (2007). Methodology of scientific research: textbook - [2nd ed.]. K.: Knowledge. 320 p.
6. Chornenky Ya.Ya. Chornenka N.V., Rybak S.B. (2006). Basics of the scientific research. Organization of independent and scientific work of the student: Textbook. K VD "Professional". 208 p.
7. Sheiko V.M., Kushnarenko N.M. (2008). Organization and methods of research: Textbook. - [2nd ed., Reworked. and ext.]. K.: Knowledge - Press. 310 p.

8. Yurinets V.E. (2011). Research methodology: a textbook. Lviv: LNU. 178 p.
9. Yablonsky V. Yablonska J., Plakhtiy P. (2001). Science. Fundamentals of research in animal husbandry and veterinary medicine: A textbook for the system of master's, postgraduate and doctoral studies. Kamyanets-Podilsky: Medobory. 244 p.

#### Additional sources

10. Goralsky L.P., Khomich V.T., Kononsky O.I. (2011). Fundamentals of histological technique and morphofunctional research methods in normal and pathology: Textbook. Zhytomyr: Polissya. 288 p.
11. Zon G.A., Ivanovska L.B., Vashchi E.V. (2016). Methodical instructions for conducting practical classes and organizing independent work on the subject "MO.I. (ethodology of Scientific Research" EQL "Master" of the Faculty of Veterinary Medicine on the topic: "Biometric processing of digital data in veterinary medicine using modern information technology". Sumy: SNAU. 27 p.
12. Meyer D. Harvey D. (2007). Veterinary laboratory medicine. Interpretation and diagnosis; 3rd ed. Per s Engl. M.: Sophion. 456 p.
13. Microbiological and virological research methods in veterinary medicine (reference manual). Ed. A.N. Golovko. Harkiv: NTMT, 2007. 512 p.
14. Basic methods of laboratory diagnosis of parasitic diseases. Geneva, WHO. 1994. 131 p.