

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SUMY NATIONAL AGRARIAN UNIVERSITY

Department of virology, forensic anatomy and
poultry diseases after prof. I.I. Panikar

"APPROVED"

Head of the department of
virology, pathologic anatomy and
poultry diseases

22.06.2020 (Zon G.A.)

WORKING PROGRAM OF THE DISCIPLINE (SILABUS)

PP.03 Veterinary virology

Specialty: 211 "Veterinary medicine"

Education program: OPP "Veterinary medicine"

Faculty - veterinary medicine

2020-2021 term

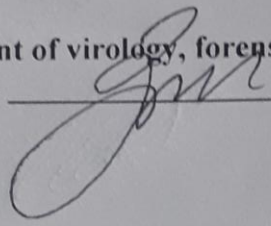
Working program for "Veterinary virology" for students
specialized in 211 "Veterinary medicine"
22.06 2020.

Developers:

Docent of the department of virology forensic anatomy and poultry diseases after pr
I.I. Panikar, c.vet.n.,
Panasenko O.S.

The program was approved at the meeting of the department of virology forensic
anatomy and poultry diseases after prof. I.I. Panikar

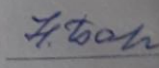
Protocol № 12 from the 22.06 2020

Head of the Department of virology, forensic anatomy and poultry diseases
after prof. Panikar I.I.  (Zon G.A.)

Agreed:

Garant of working program  (L.G. Ulko)

Dean of the Faculty of Veterinary
Medicine  (Nechiporenko O.L.)

Methodist of the quality education, licensed and accreditation 

Registered in the electronic database: Date: 03.06. 2020

Description of the training programme

Name of the value	Department of knowledge, direction of training, education level	Characteristics of the training programme	
		Daytime education	Daytime education
Amount of credits - 1	Department of knowledge: 21 Veterinary medicine	<i>Normative</i>	
	Specialty: 211 Veterinary medicine		
Modules - 2		Year of training:	
Contextual modules: 2			2019-2020
		Term	
			2
		Semester	
Total hour count - 30			4-th
	Lectures		
Weekly hours for daytime education:	Degree:		14 hrs.
	Magistr	Practice, seminar	

auditory - 1,0 independent work of students - 0		__ hrs.
	Laboratory	
		16 hrs.
	Independent work	
	Individual tasks: _____	
	Type of control:	
	test	examination

Note.

The ratio of the quantity of the auditory classes to the personal and individual student work:

daily based education -48,9/51,1 (50/50).

2. Objectives and tasks of the discipline

Objective:

Virology is a fundamental science, that creates the base for some disciplines of the veterinarian cycle. This is a science that has a goal of studying the properties of the viruses - the disease agents, methods of diagnostics, the accumulation of post-vaccine immunity and disease prophylaxis.

Tasks:

The main tasks of the "Veterinary virology" discipline are:

- study the composition of the simple and complex viruses, their architecture, chemical composition and biological properties;
- know the classification of the viruses, and the classification criteria;
- study the reproduction of viruses, their genetic traits, their variability, pathogenesis of the viral infections at the organism and cellular level;
- know the methods of laboratory diagnostics of viral diseases, principles and the sequence of the virological research;
- learn the laboratory methods of virus cultivation;
- learn the virus ecology, cellular, humoral and general physiological factors of antiviral immunity;
- know the means of specific prophylaxis and chemotherapy of viral infections;
- ability to sample the pathological material from sick and diseased animals for the laboratory diagnostics of viral diseases, its conservation, transport and preparation of viral research;
- know the structure, tasks, equipment, documentation of the virological laboratory, the rules of conduct and safety techniques while working with viruses.

Studying the discipline should result in student's ability to:

know:

- Morphology of simple and complex viruses, virus classification, reproduction inside an animal host, structure, equipment and composition of the virological laboratory and the rules of conduct there. Genetic traits of the viruses, structure and function of the viral genome, virus mutations, genetic and epigenetic virus mitigations, pathogenesis of the viral infections at the cellular and organism levels, the sequence and principles of the laboratory diagnostics of viral diseases, diagnostic express methods, methods of full virological study, methods of retrospective diagnostics.

•Morphology, antigen structure, cultivation, and environmental resistance of the rabies and Auezsky's disease viruses, the laboratory diagnostics of the illnesses, caused by the above mentioned viruses, immunity and specific prophylaxis; morphological, biological properties of smallpox viruses of mammals and avians, avian and mammal flu, foot and mouth disease, duckling hepatitis; laboratory diagnostics of the diseases, caused by the above mentioned viruses, immunity and the specific prophylaxis; morphological, biological properties of the infectious rhinotracheitis, para-flu3, cattle diarrhoea, cattle leukemia, Teschen illness, classic and African swine plague, laboratory diagnostics of the diseases, caused by the above mentioned viruses, immunity and the specific prophylaxis.

•Morphological, biological properties of Newcastle disease, avian infectious laryngotracheitis and bronchitis, Rauss's sarcoma and avian leukemia, plague and canine infectious hepatitis, rabbit mixomatosis and haemorrhagic fever, laboratory diagnostics of the diseases, caused by the above mentioned viruses, immunity and the specific prophylaxis.

be able to:

• Sample and conserve the pathological material, prepare the virus containing suspension, reveal the viruses in the path. material using the inclusion bodies and virions, infect the laboratory animals and reveal the evidence of virus multiplications in their organisms. Cultivate viruses in the chicken embryos, cultivate viruses in a cellular culture (prepare the primary cellular culture and infect it with a virus), sample the virus-containing material, find the virus in the virus-containing material.

•Titrate the viruses by the hemmagglutination and infective abilities with the evaluation of the singular effect and statistically measurable effect, find the virus or it's antibodies in the path. material using the RHGA, RIHA, RDP. Find and identify the viruses or their antibodies in NR, RIHA, IFR, RIF, PCR.

•Commence the laboratory diagnostics of rabies, mammal and avian smallpox, commence the differentiation diagnostics of Newcastle disease and avian flu, determine the primary diagnosis and commence the laboratory diagnostics of the illnesses during the solving of the diagnostic tasks.

3. Characteristics of the training programme
(approved by the Academic Board of SNAU, 22 of December 2016).

4 semester

Contextual module 1. General virology.

Topic 1. Subject, methods and tasks of veterinary virology. History of virology development. Structure of simple and complex viruses, chemical composition of the viruses. Viral nucleic acids, proteins, carbohydrates and fats Types of viral symmetry. Virological laboratory: equipment and rules of conduct Structure and tasks of the virological laboratory. Equipment of the virological laboratory. Documentation of the virological laboratory. Rules of conduct and safety technique in the virological laboratory. Influence of the environmental factors onto the viruses.

Topic 2. Virus classification. Virus classification criteria Characteristics of the DNA and RNA genome virus families. Influence of chemical substance onto the viruses.

Topic 3. Virus reproduction. General notion on virus reproduction. Features of virus reproduction mechanism. General scheme of virus reproduction.

Stages of virus reproduction. Influence of the anthropogenic factors onto the viral ecology.

Topic 4. Virus genetics. Structure and functions of the virus gene. Virus heredity. Virus genetic traits. Virus mutations. Genetic interaction and genetic material exchange in viruses. Methods of virus selection and development of live antiviral vaccines. Specific anti-virus immunity factors.

Topic 5. Viral infections pathogenesis. The features of viruses as infective agents. General principles of viral infection pathogenesis. Pathogenesis of the virus infections on the cellular level. Pathogenesis of the virus infections on the level of the organism. Non-specific factors of the anti virus immunity.

Topic 6. Principles of the laboratory diagnostics of virus diseases. Features of virus diseases diagnostics. Principles of the virological research. Sequence of the virological research. Sampling of the pathological material from sick and diseased animals for the laboratory diagnostics of viral diseases, its conservation, transport and preparation of virological research. Preparation of virus-containing suspension. Rules of pathological material sampling from the sick and diseased animals for the virological research. Indication of viruses in the

pathological material due to the inclusion bodies availability. Laboratory methods of virus cultivation. **Use of laboratory animals in virology.** Indication of viruses in the bodies of laboratory animals. Species of laboratory animals. Preparation of the laboratory animals for inoculation. The inoculation of laboratory animals. Methods of infection. Laboratory animal necropsy and path. material sampling.

Use of chicken embryos in virology. The composition of a chicken embryo.

Preparation of the chicken embryos for inoculation. Indication of viruses in the embryos, methods of infection, preparation for inoculation. Necropsy of the embryos, sampling of virus-containing material. Cell cultures and their use in virology. Types of cell cultures. Specific prophylaxy and chemotherapy of the viral infections.

Contextual module 2. Special virology.

Topic 7. Serological reactions in virology. Methods of virus titration. Titration of viruses on their infective action. Titration of viruses on their infective action with single effect evaluation. Titration of viruses on their infective action with statistically valuable effect evaluation. Titration of viruses on their haemagglutinative action. Use of serological reactions in virology, principle of the reactions, conduction technique. Reaction of slowed haemagglutination. Reaction of diffuse precipitation in the agar gel. Neutralization reaction. Reaction of indirect (passive) haenagglutination. Reaction of latex-agglutination. Reaction of slowed haemabsorbtion. Reaction of neutralized haemabsorbtion. Reaction of complement binding.

Topic 8. Rabies and Auezsky's disease viruses. Morphological, biological properties of rabies and Auezsky's disease viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods.

Topic 9. Viruses of avian and mammal smallpox. Morphological, biological properties of avian and mammal smallpox viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods. Virus of the goat and sheep contagion ectyma.

5 semester

Contextual module 3. Special virology.

Topic 7. Serological reactions in virology. Immunofluorescence reaction (method of fluorescent antibodies). The principle of IFR, use in virology. Scheme of IRF conduction. Scheme of indirect IFR conduction. Immunofluorescent analysis (assay). The principle of IFA, use in virology. Scheme of histochemical IFA variant conduction. Scheme of solid phase IFA variant conduction.

Topic 10. Viruses of avian and mammal influenza. Morphological, biological properties of avian and mammal influenza viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods.

Topic 11. Foot and mouth disease virus. Duckling hepatitis virus. Morphological, biological properties of foot and mouth disease and duckling hepatitis viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods. Virus of the geese infective enteritis, turkey enteritis virus.

Topic 12. Infectious rhinotracheitis, parainfluenza and bovine diarrhoea viruses. Morphological, biological properties of rhinotracheitis, parainfluenza and bovine diarrhoea viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods.

Topic 13. Cattle leukemia virus. Equine infectious anaemia and African swine fever viruses. Morphological, biological properties of equine infectious anaemia and African swine fever viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods. Infectious bursal disease (Gamboro disease) virus. Laboratory diagnostics of cattle leukemia using IFA.

Topic 14. Classical and African swine fever. Teschen's disease virus. Morphological, biological properties of Classical and African swine fever and Teschen's disease viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods.

Topic 15. Molecular genetic methods of diagnostics of animal virus diseases. Polymerase chain reaction, and its use in virology. PCR - principle of the reaction, scheme of conduct and use in virology. Indication of leukemia provirus using PCR.

Contextual module 4. Special virology.

Topic 16. Newcastle disease virus. Avian infectious laryngotracheitis and bronchitis viruses Marek's disease virus, avian leukemia virus. Morphological, biological properties of Marek's disease virus, avian leukemia viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods. Egg drop syndrome virus - 76.

Topic 17. Viruses of canine fever and canine hepatitis. Rabbit myxomatosis and haemorrhagic fever viruses. Morphological, biological properties of canine hepatitis and pestis viruses, rabbit mixomatosis and haemorrhagic fever viruses, laboratory diagnostics of the respective diseases, immunity and specific prophylaxis methods. Canine parvoviral enteritis. Canine adenovirus type 2.

Topic 18. Laboratory diagnostics of viral diseases. Rabies diagnostics. Rules of path. material sampling for rabies laboratory diagnostics. Rabies laboratory diagnostics. Differential diagnostics of Newcastle disease and avial flu. Use of diagnostic kits in avian viral disease diagnostics. Completion of diagnostic tasks. Differentiation diagnostics of Newcastle disease and avian flu in SHAR. Rhotavirus infection. Diagnostics of animal infective enteritis using electron microscopy. Differential diagnostics of cattle pneumoenteritis. Solving the diagnostic tasks on examples from manufacturing.

4. Structure of the discipline

4 semester

Name of the contextual modules and topics	Hours			
	daytime education			
	Total	along with		
		Lek.	Lab	Ind.
1	2	3	4	5
Module 1. General virology.				

Contextual module 1. General virology.				
Topic 1. Subject, methods and tasks of veterinary virology.	2	2		
Topic 2. Virus classification.	2	2		
Topic 3. Virus reproduction.	2	2		
Topic 4. Virus genetics.	2	2	2	
Topic 5. Viral infections pathogenesis.	10		8	
Topic 6. Principles of the laboratory diagnostics of virus diseases.				
Total for the contextual module 1	20	10	10	
Module 2. Specialized virology.				
Contextual module 2. Special virology.				
Topic 7. Serological reactions in virology.	4		4	
Topic 8. Rabies and Auezsky's disease viruses.	2	2		
Topic 9. Viruses of avian and mammal smallpox.	4	2	2	
Total for the contextual module 2	10	4	6	
Total hours for 4 semester	30	14	16	

5. Lecture topics and plans

4 semester

o. /p	Topic	Hour quantity
1	<p>Topic 1. Subject, methods and tasks of veterinary virology. Structure and chemical composition of viruses. Structure of simple and complex viruses. Viral nucleic acids, proteins, carbohydrates and fats Types of viral symmetry.</p> <p style="text-align: center;">Plan</p> <ol style="list-style-type: none"> 1. Virology as a science, it's impact on veterinary specialist training. History of virology development. 2. Structure and chemical composition of viruses. 3. Types of viral symmetry. 	2
2	<p>Topic 2. Virus classification. Virus classification criteria Characteristics of the DNA and RNA genome virus families.</p> <p style="text-align: center;">Plan</p> <ol style="list-style-type: none"> 1. Virus classification criteria 2. DNA-genome viruses 3. RNA-genome viruses 	2
3	<p>Topic 3. Virus reproduction. General notion on virus reproduction. Stages of virus reproduction.</p> <p style="text-align: center;">Plan</p> <ol style="list-style-type: none"> 1. Features of virus reproduction mechanism. 2. General scheme of virus reproduction. 3. Stages of reproduction. 	2

4	<p>Topic 4. Virus genetics. Structure and functions of the virus gene. Virus heredity. Virus genetic traits. Methods of virus selection and development of live antiviral vaccines.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Virus genetic traits and variability. 2. Virus mutations. 3. Genetic interaction and genetic material exchange in viruses. 4. Virus selection and it's use for live antiviral vaccine retrieval. 	2
5	<p>Topic 5. Viral infections pathogenesis.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. The features of viruses as infective agents. 2. General principles of viral infection pathogenesis. 3. Pathogenesis of the virus infections on the cellular level. 4. Pathogenesis of the virus infections on the level of the organism. 	2
6	<p>Topic 6. Principles of the laboratory diagnostics of virus diseases.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Features of virus diseases diagnostics. 2. Principle of virological research and it's steps. 3. Serological reactions in virology. 	2
7	<p>Topic 8. Rabies and Auezsky's disease viruses.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Rabies virus. 2. Auezsky's disease virus. 	2
Total for 4 semester		14

Total	14
--------------	-----------

**6. Topics for laboratory studies
4 Semester**

o. /p	Topic	Hour quantity
1	<p>Topic 1. Subject, methods and tasks of veterinary virology. Virological laboratory: equipment and rules of conduct. Principles of the laboratory diagnostics of virus diseases.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Structure and tasks of the virological laboratory. 2. Equipment of the virological laboratory. 3. Documentation of the virological laboratory. 4. Rules of conduct and safety technique in the virological laboratory. 5. Rules of path. material sampling for the virological research. 6. Preparation of virus-containing suspension. 	2
2	<p>Topic 2. Principles of the laboratory diagnostics of virus diseases. Indication of viruses in the path. material by presence of virions and inclusion bodies. Principles of the laboratory diagnostics of virus diseases. Use of laboratory animals in virology.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Indication of viruses in the path. material by presence of virions 2. Indication of viruses in the path. material by presence of inclusion bodies. 	2

	<p>3. Types of laboratory animals.</p> <p>4. Use of lab. animals in virology.</p>	
3	<p>Topic 3. Principles of the laboratory diagnostics of virus diseases. Indication of viruses in animal organism. Autopsy of the lab. animals and pathological material sampling. Principles of the laboratory diagnostics of virus diseases. Use of chicken embryos in virology. Indication of the viruses in the chicken embryos.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Preparation of laboratory animals before inoculation. 2. Lab. animal inoculation. Methods of inoculation. 3. Indication of viruses in the organisms of the animals. 4. Use of chicken embryos in virology. 5. The composition of a chicken embryo. 6. Preparation of the chicken embryos for inoculation. 	2
4	<p>Topic 4. Principles of the laboratory diagnostics of virus diseases. Methods of embryo infection and preparation for the infection. Necropsy of the embryos, sampling of virus-containing material.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Chicken embryo infection. 2. Methods of infection. 3. Indication of the viruses in the infected embryos. Embryo necropsy. Sampling of the virus-containing material. 4. Use of cell cultures in virology. 5. Types of cell cultures. 6. Primary-trypsinized cellular culture preparation. 	2

5	<p>Topic 5. Serological reactions in virology.</p> <p>Titration of viruses on their infective action. Titration of viruses on their haemagglutinative action.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. Titration of viruses on their infective action with single effect evaluation. 2. Titration of viruses on their infective action with statistically valuable effect evaluation. 3. Haemagglutinative properties of the viruses. 4. Setting up the HAR. Determination of the virus titre in HAU. 	2
6	<p>Topic 6. Serological reactions in virology. Hemagglutination inhibition test.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. The principle of HIT, use in virology. 2. Setting up the HIT. 	2
7	<p>Topic 7. Serological reactions in virology. Agar diffuse precipitation test.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. The principle ADPT, use in virology. 2. Setting up the ADPT. 	2
8	<p>Topic 8. Serological reactions in virology. Neutralization test.</p> <p>Plan</p> <ol style="list-style-type: none"> 1. The principle of a neutralization test, use in virology. 2. Setting up the neutralization test with a constant virus dose and different serum dilutions. 	2
Total for 4 semester		16

11. Methods of study.

1. Methods of education based on the source of knowledge:

1.1. **Verbal:** narration, explanation, talk (heuristic and reproductive), lecture, book work (reading and writing down, plan compilation, noting, preparation of tables, figures etc.).

1.2. **Visual:** demonstration, illustration, observation

1.3. **Practical:** laboratory method

2. Study methods based on perception logic.

2.1. **Analytical.**

2.2. **Synthesis method.**

3. Study methods based on individual mental activity of the students.

3.1. **Problematic** (problem-informational)

3.2. **Partial search** (*heuristic*)

3.3 **Research**

4. Active study methods - use of technical means of study, use of problematic situations, excursions, on site classes, self-evaluation of knowledges, imitation methods (construction of the future professional activity imitation), use of study or control tests, lecture notes etc.

5. Interactive education technologies - use of multimedia technologies.

12. Control methods

1. Rating control according to the 100 grade ECTC scale.

2. Intermediate control during the semester (attestation)

3. Polycriterial evaluation of ongoing student work:

- results of completion and defence of the laboratory works;

- express-control during the auditory classes;
- individual work of a topic in general or certain questions;
- essay writing;
- tests results;
- written tasks during control works;
- production situations.

13. Credit dissemination 4 semester (pass)

Ongoing tests and independent work		Independent work	Total modules SIW	Attestation	Total
Module 1 - 20 credits	Module 2 - 20 credits				
Contextual module 1	Contextual module 2				
T 1-6	Topic 7-8	5	85	5	0
20	20	1	(70+15)		

Credit dissemination 5 semester (examination)

Ongoing tests and independent work		Independent work	Total modules SIW	Attestation	Test
Module 1 - 22 credits	Module 2 - 18 credits				
Contextual module 1	Contextual module 2				
T 7,10-15	Topic 16-18	5	55	5	0
22	18	1	(40+15)		

Evaluation scale: national and ECTS.

Total credits for all studying activity	ECTS score	National scale score	
		for examination, term project, practice	for the pass
90 – 100	A.	excellent	pass
82-89	B.	good	
75-81	C		
69-74	D	satisfactory	
60-68	E		
35-59	FX	unsatisfactory with an option of repeated examination	no pass with an option of repeated examination
1-34	F	unsatisfactory with compulsory repeated study of the discipline	no pass with compulsory repeated study of the discipline

14. Methodical background

1. Veterinary virology Special virology. Part 1// Methodical instructions for conducting laboratory-practical classes / O.I.Reshetilo, O.S.Panasenko, B.A.Pedan - Sumy, 2012. - 23 p.

2. Veterinary virology Special virology. part 2// // Methodical instructions for conducting laboratory-practical classes / O.I.Reshetilo, O.S.Panasenko, B.A.Pedan - Sumy, 2013. - 21 p.

3. Veterinary virology Statement of indirect hemagglutination reaction // Methodical instructions for carrying out laboratory-practical classes / O.I.Reshetilo, O.S.Panasenko, B.A.Pedan - Sumy, 2012. - 20 p.

4. Veterinary virology ELISA production // Methodical instructions for conducting laboratory-practical classes / O.I.Reshetilo, O.S.Panasenko, B.A.Pedan - Sumy, 2013. - 28 p.

5. Veterinary virology Staging RIF, direct and indirect method // Guidelines for laboratory-practical classes / O.I.Reshetilo, O.S.Panasenko, B.A.Pedan - Sumy, 2013. - 42 p.

6. Veterinary virology Special virology. Part 3. Methodical instructions for conducting laboratory-practical classes on special veterinary virology EQL "Bachelor" part 3 serological reactions // O.I.Reshetilo, O.S.Panasenko, - Sumy, 2014 - 18 p.

7. Veterinary virology Special virology/ Methodical instructions for carrying out laboratory-practical classes on veterinary virology (workbook for hospitals part 1) "for students of the Faculty of Veterinary Medicine in Russian //O.I.Reshetilo, O.S.Panasenko, V.V. Garkava. – Sumy, 2014 – 41 p.

8. Veterinary virology/ Methodical instructions for conducting educational practice in the discipline "Veterinary Virology" EQL "Bachelor"//O.I.Reshetilo, O.S.Panasenko – Sumy, 2014 – 22 p.

9. Veterinary virology/ Methodical instructions for lectures on the subject "Veterinary Virology" EQL "Bachelor"//O.I.Reshetilo, O.S.Panasenko – Sumy, 2016 – 93 p.

10. Veterinary virology/ Methodical instructions for independent work in the discipline "Veterinary Virology" part 1 for students of the direction of training 211 "Veterinary Medicine", 212 "Veterinary Hygiene, Sanitation and Expertise" EQL "Bachelor" of the Faculty of Veterinary Medicine// O.I.Reshetilo, O.S. Panasenko – Sumy, 2017 – 100 p.

11. Methodical recommendation for conducting laboratory and practical classes in general virology. Part 1/ O.I.Reshetilo – Sumy, 2019 – 23 p.

12. Methodical recommendation for conducting laboratory and practical classes in general virology. Part 2/ O.I.Reshetilo, I.G. Zon – Sumy, 2019 – 19 p.

15. Recommended literature

Basic

1. Kalinina O.S., Panikar I.I., Skibytsky V.G. Veterinary virology / O.S. Kalinina, I.I. Panikar, V.G. Skibitsky. - K.: Vuscha osvita, 2004.- 432p.

2. Workshop on veterinary virology /Kalinina O.S., Panikar I.I., Skibytsky V.G. – Sumy: Kozatsky val, 1997. - 236p.
3. Workshop on veterinary virology / Skibytsky V.G., I.I. Panikar, O.A. Tkachenko et al. - K.: Vuscha osvita, 2005. - 208p.
4. Workshop on special veterinary virology /Kalinina O.S., Panikar I.I., Skibytsky V.G. – Sumy, 2005. - 84 p.
5. Syrin V. N., Soloviev B., V., Fomina N., V. Animal viral diseases / Syrin V.N., Soloviev B.,V., Fomina N.V. - M.: VNITIBP, 1998.- 928c.

Supplementary

1. 1. Veterinary Virology Workshop / N.I.Trotsenko, R.V.Belousova, E.A.Preobrazhenskaya – M.: Agropromizdat, 1986. - 287 p.
2. Syrin V.N., Fomina N.V. Private Veterinary Virology - A Reference Book / Syrin V.N., Fomina N.V. - M.: Kolos, 1996. - 472 p.

16.Information resources

1. Veterinary Virology Workshop / R.V.Belousova, N.I.Trotsenko, E.A.Preobrazhenskaya - <http://knigi.tr200.biz/index.php?id=3458193>
2. Veterinary Virology / R.G. Gosmanov, N.M. Koluchev, V.I. Pleshakova - http://e.lanbook.com/books/element.php.pl1_cid=25&pl1_id=569