

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY
Department of anatomy, normal and pathological physiology of animals
Faculty of Veterinary Medicine

MODULE SYLLABUS

Genetics and breeding

Implemented in the “Veterinary Medicine” Academic Program

Area of specialization 211 “ Veterinary Medicine”

at the second (master 's) level of higher education

Sumy-2024

Author: [Signature] (Kalashnyk O.M., Phd, Associate professor of department of anatomy, normal and pathological physiology of animals)

Module syllabus agreed at the _____ Department meeting	Minutes No <u>17</u> dated <u>04.06</u> 2024
	Head of the Department of Anatomy <u>[Signature]</u> (M.D. Kambur)

Approved by:

Guarantor of the Academic program [Signature] (P. Nezhov)

Dean of the Faculty [Signature] (O. Nechyporenko)

Syllabus review (attached) is provided by : [Signature] (O. Shklyarska)
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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

1. MODULE OVERVIEW

1.	Title	Genetics and breeding			
2.	Faculty/Department	Faculty of Veterinary Medicine, Department of Anatomy, Normal and Pathological Physiology			
3.	Type (compulsory or optional)	compulsory			
4.	Program(s) to which module is attached	211 "Veterinary Medicine"			
6.	Level of the National Qualifications Framework	7-th			
7.	Semester and duration of module	1			
8.	ECTS credits number	5 ECTS			
9.	Total workload and time allotment	Directed study			Self-directed study
		Lectures	Practicals	Labs	
		2	-	4	144
10.	Language of instruction	English			
11.	Module leader	Kalashnyk O.M., Phd, Associate professor of department of anatomy, normal and pathological physiology of animals			
12.	Module leader contact information	kalashnikan@ukr.net			
13.	Module description	The educational program on genetics and breeding is part of the educational chain associated with the overall objectives of training highly qualified veterinarians. Acquired knowledge of the discipline contributes to the successful solution of problems to increase the resistance of animals to infectious and invasive diseases and prevent the manifestation of genetic abnormalities; mastering the modern theory of animal breeding, methods of their selection and selection and evaluation of breeding and productive qualities, ways of breeding and improvement of existing breeds, types and lines of animals; development of modern advanced technologies for the production of certain types of livestock products. Assimilation of material from this OP forms the basis of genetic knowledge of the student and the future veterinarian, contributes to the personal and professional development of the student.			
14.	Module aim	The purpose of the educational component is to acquire knowledge of cytological and molecular bases of heredity, elucidation of patterns of inheritance of opposite qualitative and quantitative traits in certain species of farm animals, study of processes occurring in animal populations and their use in breeding and breeding work and disease prevention. Also, the study of the discipline aims to clarify the laws of ontogenesis, exterior and constitutional features of animals depending on the type and direction of productivity, mastering the basic principles of selection and selection, methods of animal breeding, organization of breeding, development of modern technologies for basic products. livestock. It is a component of the learning process that ensures the achievement of goals, competencies and significant results in the learning process.			
15.	Module Dependencies	1. The educational component is based on the studied OK in anato-			

	(prerequisites, co-requisites, incompatible modules)	my, morphology, cytology 2. The educational component is the basis for the study of physiology, therapy, pathological anatomy and physiology, obstetrics, gynecology
16.	The policy of academic integrity	All tasks related to calculations, planning and accounting documentation will have individual initial data. For violation of academic integrity, students may be held subject to the following academic liability: <i>Academic plagiarism</i> - grade 0, re-completion of the task. <i>Academic fraud</i> (copying, deception, publishing someone's work for their own) - cancellation of points; re-assessment evaluation re-execution of non-independently performed work with new source data; <i>The use of electronic devices</i> during the final control of knowledge - removal from work, grade 0, re-passing the final control.
17	Link in Moodle	https://cdn.snau.edu.ua/moodle/course/view.php?id=

2. CORRELATION BETWEEN MODULE LEARNING OUTCOMES (MLOs) AND PROGRAM LEARNING OUTCOMES (PLOs)

MLOs: On successful completion of the module the learner will be able to:	PLOs					How assessed
	PRN 2. Use information from domestic and foreign sources to develop diagnostic strategies	PRN 3. To determine the essence of physicochemical and biological processes that occur in the body of animals in normal and pathological conditions. PRN..	5. To determine the relationship between clinical manifestations of the disease and the results of genetic research	PRN 7. Develop prevention strategies and means of keeping and feeding animals	PRN 11. Summarize and analyze information on the effectiveness of veterinary specialists.	
MLOs 1. Know the ways of realization of hereditary information in the process of ontogenesis, methods of crossing for analysis of genotype of animals.	+	+		+		Case studies and situation analysis
MLOs 2. Know the ways of transmission of hereditary information in bacteria and viruses, the basics of hereditary resistance of animals to certain diseases and the causes of genetic abnormalities.	+	+	+	+	+	Presentations and discussions with self- and mutual evaluation.
MLOs 3. Know the basic patterns of genetic processes occurring in populations of farm animals, biological characteristics of animals of different species that affect their production and their reproductive qualities and methods of assessing breeding and productive qualities of animals			+	+	+	Presentations and discussions.
MLOs 4. Be able to use methods of managing the heredity of organisms, biometric method for assessing the effectiveness of veterinary and preventive measures in the fight against animal diseases, genealogical analysis of herds to identify hereditary resistance of animals to diseases and causes of genetic abnormalities			+	+	+	Situational tasks

MLOs 5. Be able to determine the ratio of genotypes and frequency of semi-lethal and lethal genes in animal herds, determine the growth rates of animals, assess their breeding and productive qualities, organize the reproduction of herds and rational rearing of young animals.				+	+	Practical test of application skills
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3. MODULE INDICATIVE CONTENT

Topics	Distribution of hours			Learning resources	
	Directed study		Self-directed study		
	Lecture	Pr		Lecture	Pr
1 semester	2	4		144	
Topic 1. Cytological basis of heredity.	-		2	30	1, 2, 3, 4, 5, 11
1.Chromosome morphology, normal karyotype and pathology, causes of pathology and consequences.				10	
2.Mitosis, mitotic cycle. Anomalies, their causes and consequences in mitosis. Veterinary diagnosis of pathology.			2	10	
3.Meiosis and pathologies of macro- and microgametogenesis.				10	
Topic 2. Inheritance of traits during sexual reproduction and their use in veterinary medicine				30	1, 2, 3, 4, 6, 7, 10, 12, 14
1.Works by G. Mendel. Hybridological analysis and types of dominance: complete, incomplete, codominance, overdominance.	2			10	
2. Mono- and polyhybrid crossing. types of gene interaction: allelic and non-allelic. Features of cleavage in epistasis, complementarity, polymerization. Penetration, expressiveness, reaction rate genotypes.				10	
3. Genetics of sex. Autosomes and sex chromosomes. Sex index, Bridges' experiments. Aneuploidy on sex chromosomes. Freemartines in cattle. Inheritance of traits linked to sex. Gender regulation in agriculture animals by a veterinarian.				10	
Topic 3. Chromosomal theory of heredity and its significance for the veterinarian.			2	30	1, 2, 3, 4, 5, 6, 7, 10, 13, 14
1. Complete and incomplete adhesion of signs. The value of the works of T. Morgan. The main provisions of chromosomal theory.			2	20	
2. Crossingover, its frequency, intensification. The principle of constructing genetic maps of chromosomes. Characteristics of genetic maps of chromosomes.				10	
Topic 4. Molecular basis of heredity. DNA and RNA are material carriers of heredity.				20	1, 2, 3, 4, 5, 6, 18
1. Modern ideas about the structure of the gene. Genetic code, its main characteristics: collinearity, degeneracy, universality, non-				101	

overlapping. Protein synthesis in the cell, regulation of gene activity. Violation of the implementation of genetic information, the role of antibiotics.					
2.The structure of nucleic acids. Rules of Chargaff. RNA types. Introns, exons. Processing, splicing..				10	
Topic 5. Immunogenetics. Mutational variability. Genetics of immunity, anomalies and resistance of animals to diseases. Genetics of microorganisms				12	1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 14
1. Immunogenetics. Mutational variability. Genetics of immunity, anomalies and resistance of animals to diseases.				4	
2. Structure and reproduction of bacteria and viruses. Structure and role of plasmids.				4	
3. Interaction of phages with bacterial cells. Lysogenic, genotype and phenotype in bacteria.				4	
Topic 6. Breed and its structure. Ontogenesis, exterior, constitution and interior of animals. Productivity of farm animals.				12	1, 2, 3, 4, 6, 7, 15, 18
1. Breed and its structure. Individual development of farm animals.				4	
2. Productivity of farm animals, its accounting and evaluation methods.				4	
3. Exterior, methods of exterior evaluation, types of constitution of farm animals. Animal interior, its use in breeding.				4	
Topic 7. Selection and selection in animal husbandry. Methods of breeding farm animals.				10	1,2, 3, 4, 16, 18
Topic 1. Theoretical foundations of selection and selection of farm animals.				5	
Topic 2. Methods of breeding farm animals.				5	
Total	2		4	144	

4. TEACHING AND LEARNING METHODS

MLOs	Teaching methods (directed study)	Hours	Learning methods (self-directed study)	Hours
- Know the ways of realization of hereditary information in the process of ontogenesis, methods of crossbreeding for analysis of animal genotype, ways of transmission of hereditary information in bacteria and viruses, the basics of hereditary resistance of animals to certain diseases and the causes of genetic anomalies, genetic polymorphic protein systems and blood groups of animals, the basic laws of genetic processes occurring in populations of farm animals, biological characteristics of animals of different species, which affect the production of their products and their reproductive qualities and methods of assessing the breeding and productive qualities of animals. - To be able to use methods of management of heredity of organisms, a biometric method of an estimation of efficiency of application of veterinary preventive and curative actions in struggle against diseases of animals, the genealogical analysis of herds for the purpose of detection of hereditary resistance of animals to diseases and causes of genetic anomalies, to determine	In the process of providing material on genetics and breeding in lectures, the following work will be carried out: - presentation of lecture material according to the plan; - discussion of lecture material; - proposals for literature on each topic of lectures; - use of Moodle, Zoom in the lecture process - consultations of students in the process of mastering OK in genetics and breeding - methodical design of all types of student work; - control of the educational process individually by each student (modules, tests, exams)	2 hours a week	In the process of lectures and PHC, the student must independently perform: - registration of research records - mastering research methods; - independent work during research - fixation of research results; - analysis of research results; - registration of conclusions from the received data; - fixation of lecture material - obligatory preparation for the hospital, mastering the lecture material for the hospital.	2 hours a week

the ratio of genotypes and the frequency of semi-lethal and lethal genes in herds of animals, to determine the growth rates of animals, to assess their breeding and product qualities, to organize reproduction of herds and rational rearing of young animals. -Know the qualitative differences of physiological functions in animals in different environmental conditions. - Be able to apply knowledge during practical activities. - Know the elements of conducting and organizing scientific physiological research.				
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5.ASSESSMENT

5.1. Diagnostic assessment

5.2. Summative assessment

5.2.1. Intended learning outcomes methods:

No	Summative assessment methods	Grades	Deadline
1-th semester			
1.	Surveys at laboratory-practical classes, design of a notebook	55/55%	3, 8, 12,15th weeks
2.	Preparation of abstracts/presentations	15/15%	15th week
3.	The exam is a multiple choice test	30/30%	18th week

5.2.2. Grading criteria

Summative assessment method	Unsatisfactory	Satisfactory	Good	Excellent
Surveys at laboratory-practical classes, design of a notebook	<20 points	21-41 points	42-44 points	45-55 points
	Notebooks of laboratory-practical lessons are not prepared, there are no conclusions and their analysis	Notebooks of laboratory-practical lessons are not prepared, there are no conclusions and their analysis	Notebooks of laboratory-practical lessons are not prepared, there are no conclusions and their analysis	Notebooks of laboratory-practical lessons are not prepared, there are no conclusions and their analysis, the student understands the problems set to be solved, is able to develop and evaluate possible solutions to this problem
Preparation of abstracts	<8 points	9-12 points	13-14 points	15 points
	Task not completed	The abstract is drawn up without understanding the interrelationship of the tasks set to be solved, unable to critically evaluate information from literature sources	In the essay, the analysis, synthesis, generalization and critical evaluation of data from literary sources given in the essay is carried out at a good level, capable of critically evaluating information from literary sources	The abstract is impeccably designed, the material is logically arranged with an understanding of the interrelationships of the processes revealed on this topic, it demonstrates a highly developed ability to critical academic literature and other sources of information
The exam is a multiple choice test	<15 points	16-20 points	21-29 points	30 points
	Task not completed	The task is 50% complete	The task is 75 % complete	The task is 100% complete

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.

No	Formative Assessment elements	Date
Autumn semester		
1.	Surveys in laboratory-practical classes, design of a notebook with comments	Each time you check the completed acts and accompanying
2.	Oral (written) reviewing of abstracts/presentations	Blitz control at the beginning of 2,3,4,7,8,10, 14 and 15 classes (in the 6th semester)
	Evaluation of the activity and effectiveness of applicants' participation in focus groups and role-playing in simulation exercises. Comments and tips.	Each time in the form of focus groups or simulation exercises
	Feedback with comments and recommendations on how to solve problems	11th week
	Assessment, exam - multiple choice test	According to the schedule

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

6. LEARNING RESOURCES

6.1. Key resources

1. Genetics of animals / [Khmelnitsky LM, Suprun IO.]. - Kyiv :, 2020. - 402 p.
2. Genetics of farm animals / [Konovalov OA, Kovalenko VP, Nedviga MM etc.]. - Київ: Урожай, 2016. - 430 с.
3. Protsenko M.Yu. Genetics / M.Yu. Protsenko. - К .: Вища школа, 2014. - 302 с.
4. Genetics / Merkurieva EK, Abramova ZV, Bakay AV, Kochish II - М .: Agropromizdat, 1991. - 444 p.
5. Breeding of agricultural animals / [Basovsky MZ, Burkat VP, Vinnychuk DT etc.]. - Bila Tserkva, 2001 - 400 p.
6. Breeding of farm animals with the basics of special zootechnics / [TV Drought, M.V. Zubets, J.Z. Siratsky, OG Tymchenko and others]. - К .: Agrarian Science, 1999. - 510 p.
7. Workshop on breeding farm animals / [Melnyk YF, Naidenko KA, Zhuravel MP etc.]. - Kyiv: Slovo Publishing House, 2007. - 240 p.

6.3.2 Methodological support

8. Methodical instructions for laboratory-practical works on studying the course "Genetics in veterinary medicine" and tasks for self-control "Molecular bases of heredity" / [O. M. Kalashnik, MD Kambour, LV Plyuta]. - Sumy, 2014 - 24 p.
9. Methodical instructions for laboratory and practical work on the study of the course Genetics in Veterinary Medicine "and tasks for self-control" Genetic patterns of inheritance of traits "/ [O. M. Kalashnik, MD Kambour, LV Plyuta]. - Sumy, 2020 - 25 p.
10. Methodical instructions for laboratory-practical work on studying the course "Genetics in veterinary medicine" and tasks for self-control "Genetic variability" / [O. M. Kalashnik, MD Kambour, LV Plyuta]. - Sumy, 2014 - 25p.
11. Methodical instructions for laboratory-practical work on studying the course "Genetics in veterinary medicine" and tasks for self-control "Methods of veterinary genetics" / [O. M. Kalashnik, MD Kambur, LM Kovalenko]. - Sumy, 2020 - 25 p.

6.3.3. Other sources

6. 4. Additional sources

12. Litvinenko OI Genetics. Collection of problems / Litvinenko OI, Artamentova LO - К .: Вища школа, 2017. - 135 с.
13. Pavlov BA Genetic anomalies of different species of animals and birds, their manifestation and patterns of inheritance / B.A. Pavlov. - Lviv, 2018.— 30 p.
14. The interior of farm animals: Textbook. manual / [J.Z. Siratsky EI Федорович, Б.М. Нопка, etc.]. - Kyiv: Higher Education, 2009. - 280 p.
15. Fundamentals of technology for the production of livestock / [MF Kulik, TV Drought, VK Юрченко, M.O. Sweet, etc.]. - К .: Silgosposvita, 2014. - 432 p.
16. Peshuk LP Fundamentals of animal husbandry and veterinary-sanitary examination of meat and meat products / L.P. On foot. - Kyiv: Center for Educational Literature, 2011. - 340 p.
17. Breeding work (handbook). / Edited by MV Zubtsya, M.Z. Basovsky. - Kyiv: Association "Ukraine", 2015. - 440 p.

6.5. Software

18. Work program (syllabus) of the educational component "genetics and breeding"
19. Class schedule
20. Schedule of protection of laboratory-practical notebooks
21. Schedule of defense of genetics notebooks with basics of variation statistics.