

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY

Department Technologies of fodders and animal feeding

"APPROVED"

Chair of department TFAF

_____ **Bondarenko Yu. V.**

“ _____ ” _____ **2020.**

WORKING DISCIPLINE PROGRAM

Optimization of animal feeding

(code and title of discipline)

**Degree on subject area 204 «Technology of production and processing of
livestock products»**

***Educational program:* 204 «Technology of production and processing of
livestock products»**

Educational degree: Doctor of Philosophy

Faculty: Bio-technology

Working program on discipline «**Optimization of animal feeding**» for competitors for D. Ph. Degree on subject area 204 «Technology of production and processing of livestock products»

Elaborator: c. a. s, associate professor Opara V.O.

Working program was considered at the meeting of department Technologies of fodders and animal feeding

Minutes No__12_____ dated ____5.06.2020_____

Guarantor of the educational program _____ (LM Khmelnytsky)

Head of postgraduate and doctoral studies _____ ()

1. Description of the subject

Names of indexes	Branch of knowledge, specialization, educational and qualification level	Characteristics of discipline	
		Full-time tuition	Part-time tuition
Number of credits – 5	Field of study: 20 Agrarian Sciences and Foodstuffs_	selective	
	Subject area: 204 – Technology of production and processing of livestock products (code and title)		
Modules – 4		Academic year:	
Content modules: 10		2020-2021	
		Course	
		2	
		Semester	
Total number of hours – 150		4	
Weekly hours for full-time education: Class-room work – 3 Individual work of a student - 7	Educational degree: <i>Doctor of philosophy</i>	Lectures	
		20	
		Practical, seminars	
		30	
		Laboratory	
		-	
		Individual work	
50			
		Individual tasks:	
		50	
		Form of control:	
		Credit	

Comment.

Ratio of a number of hours of classroom training to self-organized and individual work is (%):

Full-time tuition - 50/100

2. Aim and tasks of the subject

Aim: developing in competitors for higher education level "doctor of philosophy" skills for using knowledge on the organization of complete feeding of farm animals of all species and sex-age groups necessary for professional activity, as well as to develop skills of independent research and pedagogical activity.

Tasks: to form a system of theoretical and practical skills, which are necessary for solving the problems of animal feeding and fodder technology for competitors for the third level of higher education - doctor of philosophy on specialty 204 "Technology of production and processing of animal products".

Study of the discipline is based on acquired knowledge of animal morphology and physiology, fodder production, animal feeding, organic chemistry, biochemistry, biotechnology in animal husbandry, modeling of technological processes in animal husbandry, biology of animal productivity.

Learning results:

To know: Modern fodder production technologies and indicators and methods of complex evaluation of their composition; scientific fundamentals of normalized animal feeding for different production groups; methodology of compilation and analysis of rations with the usage of computer program; planning of animal fodder requirements per year, methods of controlling the value of animal feeding based on the study, systematization and prediction of relationship between animal nutrition and productivity, physiological and biochemical status of the organism, genotype of animals and quality of livestock products.

To be able to: in the production, to analyze existing technologies of growing, production and storage of fodders and improve them using the latest scientific and technological developments; work with certificates and standards of fodder quality; to determine deviation from nutrient content norm of the diet by changes in performance, external characteristics or behavior of animals; analyze feeding conditions and rations and formulate professional conclusion about the diet's compliance with the needs of animals; determine feasibility and effectiveness

of application of various feed additives in the diets, machinery and equipment to improve fodder conversion, rise animal productivity and reduce production costs.

3. The discipline program

Module 1. Chemical composition and nutrition of fodders. Metabolism and energy in animal organism. Fodders. Normalized feeding of dairy and meat cows and bull-sires.

Content module 1. Introduction to the course "Optimization of animal feeding". Chemical composition of fodders. Metabolism and energy in organism of animals.

Topic 1. Introduction. Estimation of nutritional value of fodders by chemical composition. Introduction to the course. A comprehensive system for assessing nutrition and quality of fodders. Knowledge of basic concepts of the system of complex assessment of fodder nutrients. Fodder classification.

Topic 2. Metabolism and energy exchange in animal organism. Characteristics of modern methods for estimation of fodder energy nutrition.

Content module 2. Feeding means and fodders.

Topic 3. Volume fodders. Current requirements for technology of silage and hay harvesting.

Topic 4. Concentrated fodders.

Content module 3. Normalized feeding of agricultural animals. Feeding of dairy and meat cows and bull-sires.

Topic 5. Normalized feeding of agricultural animals. Normalized feeding of farm animals. Main indicators of feeding standards and diets for cows. Determination of feeding standards and their amendment for cows

Topic 6. Feeding of cows and bull-sires. Feeding means, diets and compound fodders for new-calved milking cows. Peculiarities of feeding cows during the period of milking. Feeding of milking cows during the period of relatively constant lactation and in the phase of lactation damping. Feeding of calving dry cows. Growing of pedigree bulls and feeding of bull-sires. Balancing different nutritional indicators of ratios for milking cows with the help of calculators. Studying of electronic program for calculating diets for cattle. Calculation of the diet in individual task for milking dry cow in summer (pasture) and barnyard periods on PC. Calculation of the diet in individual task for calving dry cow in summer (pasture) and barnyard periods on PC. Conducting individual task of composing a diet for calving dry and lactating cows of meat breeds. Conducting individual task of composing a diet for bull-sires. Calculation of annual need for fodders for a herd of cows.

Module 2. Feeding of young cattle and sheep

Content module 4. Feeding of young cattle.

Topic 7. Feeding of repair young cattle. Feeding of calves to 6 months of age. Feeding of repair heifers older than 6 months. Analysis of feeding schemes of repair heifers from birth to 6 months of age.

Topic 8. Feeding cattle when growing for meat. Growing and fattening of young and adult cattle. Feeding cattle of meat breeds.

Content module 5. Feeding of sheep.

Topic 9. Feeding of sheep. Biological features of using fodders by sheep. Pasture keeping of sheep. Peculiarities of feeding base of sheep breeding. Feeding of rams. Feeding of ewes. Feeding lactating ewes and lambs after birth and beating. Learning peculiarities of feeding standards and composing a diet for sheep.

Module 3. Feeding of pigs and horses

Content module 6. Feeding of pigs.

Topic 10. Feeding of sows and boars. Biological features of metabolism and nutrition of pigs. Feeding boars and sows. Study of digestion peculiarities and feeding standards of pigs. Projecting diets for different pig production groups using a computer program. Projecting full compound feed recipes for different pig production groups using a computer program. Calculation of annual need for fodders for a herd of pigs for a certain number of main sows according to individual tasks.

Topic 11. Feeding of young pigs. Feeding of young pigs during the period of rearing and fattening. Feeding of repair young pigs.

Content module 7. Horse Feeding

Topic 12. Feeding of horses. Biological features of horse digestive system and standards of their feeding. Calculation of diets for different technological groups of horses.

Module 4. Feeding of rabbits, poultry and carnivorous animals.

Content module 8. Feeding rabbits.

Topic 13. Biological features of rabbit digestive system and its nutrition.
Feeding rates for adult rabbits and young animals. Calculation of diets for different technological groups of rabbits.

Content module 9. Poultry feeding.

Topic 14. Feeding of laying hens. Feeding of turkeys. Feeding features of broiler hens. Feeding of ducks. Feeding of geese. Biological features of poultry digestive apparatus. Feeding of laying hens. Basic feeding means and compound fodders for hens. Composition and nutrition of complete combined fodders for young birds and adult hens and turkeys. Feeding peculiarities of broiler hens. Feeding of ducks. Feeding of geese. Study of digestion features and feeding standards of poultry.

Content module 10. Feeding of carnivorous animals.

Topic 15. Feeding of carnivorous animals. Peculiarities of rationing and practical feeding of minks. Study of peculiarities of norms and diets for mink feeding.

4. Structure of the subject

Names of content modules and topics	Number of hours											
	Full-time						Part-time					
	Total	including					Total	including				
		l	p	lab	ind	i.w.		l	p	lab	ind	i.w.
1	2	3	4	5	6	7	8	9	10	11	12	13
Module 1. Chemical composition and nutrition of fodders. Metabolism and energy in animal organism. Fodders. Normalized feeding of dairy and meat cows and bull-sires												
Content modul 1. Introduction to the course "Optimization of animal feeding". Chemical composition of fodders. Metabolism and energy in organism of animals.												
Topic 1. Introduction. Estimation of nutritional value of fodders by chemical composition.	14			2	-	12						
Topic 2. Metabolism and energy exchange in animal organism.	4	2		-	-	2						
Total of content module 1	18	2		2		14						
Content modul 2. Feeding means and fodders.												
Topic 3. Volume fodders	4	2		-	-	2						
Topic 4. Concentrated fodders.	4	2		-	-	2						
Total of content modul 2	8	4		-	-	4						
Content modul 3. Normalized feeding of agricultural animals. Feeding of dairy and meat cows and bull-sires.												

Topic 5. Normalized feeding of agricultural animals	6	2		2	-	2							
Topic 6. Feeding of cows and bull-sires	18	2		12	-	4							
Total of content modul3	24	4		14	-	6							
Modul 2. Feeding of young cattle and sheep													
Content modul 4. Feeding of young cattle													
Topic 7. Feeding of cows and bull-sires.	6	2		2	-	2							
Topic 8. Feeding cattle when growing for meat.	4	2		-	-	2							
Total of content modul 4	10	4		2	-	4							
Content modul 5. Feeding of sheep													
Topic 9. Feeding of sheep	6	2		2	-	2							
Total of content modul 5	6	2		2	-	2							
Modul 3. Feeding of pigs and horses													
Content modul 6. Feeding of pigs.													
Topic 10. Feeding of sows and boars	4			2	-	2							
Topic 11. Feeding of young pigs.	4	2		-	-	2							
Total of content modul 6	8	2		2		4							
Content modul 7. Horse Feeding													
Topic 12. Horse Feeding	4			2		2							
Total of content modul7	4			2		2							
Modul 4. Feeding of rabbits, poultry and carnivorous animals.													
Content modul 8. Feeding rabbits.													
Topic 13. Biological features of rabbit digestive system and its	4			2		2							

nutrition. Feeding rates for adult rabbits and young animals.												
Total of content modul 8	4			2		2						
Content modul 9. Poultry feeding												
Topic 14. Feeding of laying hens. Feeding of turkeys. Feeding features of broiler hens. Feeding of ducks. Feeding of geese.	6			2		2						
Total of content modul 9	6	2		2		2						
Content modul 10. Feeding of carnivorous animals												
Topic 15. Feeding of carnivorous animals and minks	12	-		2		10						
Total of content modul 10	12	-		2		10						
Total hours	100	20		30		50						
INHT						50						
Total hours	150	20		30		50	50					

5. Topics and plan of lectures

№	Topic name	Number of hours
1	Topic 1. Characteristics of modern methods for estimating energetic nutrition value of feeding means. Lecture plan: Exchange energy and feeding unit Pure energy of lactation (PEL)	2
2	Topic 2. Current requirements for technology of silage and hay harvesting. Lecture plan: Biological essence of silage making process. Silage harvesting technology. Current requirements for haymaking technology.	2
3	Topic 3. Concentrated fodders.	2

	<p>Lecture plan: Cereal grain and products of its processing Leguminous grain and products of its processing Concentrated fodders obtained from the processing of plant material</p>	
4	<p>Topic 4. Normalized feeding of farm animals. Main indicators of feeding standards and diets for cows.</p> <p>Lecture plan: Main aim and tasks of rationing animal feeding. Convention of notion norm and dependence of norm variants on various factors. Values of different indicators of norms for preparation of diets and organization of balanced nutrition of animals. Peculiarities of fodder digestion of ruminants. Feeding rates and rations for calving milking and dry-standing cows.</p>	2
5	<p>Topic 5. Feeding means, rations and compound fodders for new-calved milking cows. Peculiarities of feeding cows during the period of milking stimulation. Feeding of milking cows during relatively stable lactation and in the phase of lactation damping. Feeding of calving dry-standing cows. Growing of pedigree bulls and feeding of bull-sires.</p> <p>Lecture plan: Main fodders for feeding cows directly during calving. Feeding cows during gradual increase of fodder giving after calving. Transition to the period of milking stimulation of a cow. Peculiarities of feeding cows during the period of milking stimulation. The end of milking stimulation period of cows. Feeding of cow during rather steady gradual decrease in daily milk yield. Preparing a cow for dry season. Feeding cows in the final stage of lactation. Feeding at the start (stop milking) of a cow. Specificity of rationing of calving dry-standing cows. Feeding peculiarities of dry-standing cows. Technology of breeding and feeding of pedigree bulls. Feeding bull-sires.</p>	2
6	<p>Topic 6. Feeding calves to 6 months of age. Feeding of repair heifers older than 6 months. Feeding calves to 6 months of age. New feeding schemes for calves in milk and transition periods. Peculiarities of rationing of feeding of repair heifers. Peculiarities of repair heifer feeding.</p>	2
7	<p>Topic 7. Growing and fattening of young and adult cattle. Main aim and tasks of growing young cattle for beef production. The final fattening stage of young and</p>	2

	adult cattle for meat.	
8	Topic 8. Biological features of fodder use by sheep. Pasture keeping of sheep. Peculiarities of feeding base of sheep breeding. Feeding of rams. Lecture plan Biological features of sheep and goats. Nutrition regulation of sheep. Peculiarities of feeding base of sheep breeding. Feeding of rams.	2
9	Topic 9. Feeding of young pigs during the period of growing and fattening. Feeding of repair young pigs. Feeding of suckling piglets after birth. Training of piglets for feeding. Weaning of piglets from sows. Basic principles of piglet weaning technology. Feeding piglets after weaning and main types of young pig fattening. Peculiarities of keeping and feeding of repair young pigs.	2
10	Topic 10. Basic feeding means and compound fodders for hens. Composition and nutrition of complete combined fodders for young birds and adult hens and turkeys. Feeding means for hens and requirements for their quality. Complete combined fodders for laying hens. Complete combined fodders and technology of feeding them to poultry. Feeding technology for young and adult poultry.	2
	Total for discipline	20

6. Topics of laboratory classes

№	Names of topics	Number of hours
1	Learning basic concepts of system for complex nutrition assessment of feeding means. Fodder classification.	2
2	Determination of feeding standards and their amendment for cows	2
3	Balancing of various nutritional indicators of ratios for milking cows with the help of calculators	2
4	Studying of electronic program for calculating of diets for cattle	2
5	Part 1. Calculation of diet, as individual task, for a milking cow in summer (pasture) and barnyard periods on PC.	2
6	Conducting individual task on composing a diet for calving dry-standing and lactating cows of meat breeds	2
7	Conducting individual task on composing a diet for	2

	bull-sires	
8	Calculation of annual need for fodders for a herd of cows	2
9	Analysis of schemes for repair heifer feeding from birth to 6 months of age	2
10	Study of peculiarities of feeding standards and composing of diets for sheep	2
11	Calculation of annual fodder need for pig herd for a certain number of main sows (individual tasks)	2
12	Calculation of diets for different technological groups of horses	2
13	Calculation of diets for different technological groups of rabbits	2
14	Study of peculiarities of digestion and feeding standards of poultry	2
15	Study of peculiarities and norms of mink feeding	2
	Total for discipline	30

7. Independent work

Independent work of postgraduate students during the study of discipline involves learning of theoretical course on lecture notes, basic and additional literature, and preparation for defense of practical tasks, processing of materials of current edition of zoo-technical and special literature according to recommendations of the teacher.

№	Names of topics	Number of hours
1	Introduction. Estimation of nutritional value of feeding means by chemical composition.	12
2	Metabolism and energy exchange in animal organism	2
3	Volume fodders	2
4	Concentrated fodders	2
5	Normalized feeding of farm animals.	2
6	Feeding of cows and bull-sires	4
7	Feeding of repair young cattle.	2
8	Feeding cattle when growing for meat.	2
9	Feeding of sheep.	2
10	Feeding sows and boar-sires.	2
11	Feeding of young pigs.	2
12	Feeding horses	2
13	Biological features of digestive system and nutrition of rabbits. Feeding rates of adult rabbits and young animals.	2

14	Feeding of laying hens. Feeding of turkeys. Feeding peculiarities of broiler hens. Feeding of ducks. Feeding of geese.	2
15	Feeding of carnivorous animals and mink	10
	Total for discipline	50

8. Individual tasks

1. Preparation of rations for different types of farm animals on individual tasks.

Topics of individual tasks of graduate students:

1. Balancing different nutritional indicators of rations for dairy cows using calculators
2. Calculation of the diet for an individual task for a dairy cow in the summer (grazing) and stall periods on a PC
3. Execution of an individual task on drawing up a diet for pregnant dry and lactating cows of meat breeds
4. Execution of an individual task to compile a diet for breeding bulls
5. Calculation of annual feed requirements for a herd of cows
6. Design of rations for different production groups of pigs using a computer program
7. Designing recipes for complete feed for different production groups of pigs using a computer program

Consultations on theoretical course of the discipline are provided for postgraduates in accordance with the schedule of the department work, regulated by pedagogical amount of work to be done, and when it is necessary and aim to assist postgraduates in their successful mastering of theoretical course.

9. Training methods

1. Learning methods by source of knowledge:
 - 1.1. **Verbal:** story, explanation, conversation (heuristic and reproductive), lecture, briefing, work with a book (writing, planning, reviewing, summarizing, supporting notes, etc.).

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

1.3. **Practical:** laboratory method, practical work, exercise, production and practical methods.

2. Methods of learning by the nature of logic perception.

2.1. Analytical

3. Methods of learning by the nature and level of graduates' independent mental activity.

3.1. Partial search (heuristic)

3.2. Research

3.5. Explanatory and demonstrative

4. Active methods of learning: use of technical means of training, training on the production, group research, self-assessment of knowledge, use of training and control tests, use of basic lecture notes and others)

5. Interactive learning technologies: use of multimedia technologies, electronic tables, dialog learning.

6. Personalized learning

10. Control methods

1. Rating control on 100-point ECTS rating scale

2. Multi-criteria evaluation of current work of postgraduates:

- level of knowledge demonstrated at practical, laboratory and seminar classes;
- activity during the discussion of issues raised in the class;
- results of laboratory work execution and protection;
- express control during classes;
- self-study of the whole topic or individual issues;

Credit-module system is used for activation of class and independent work of postgraduates. It foresees differentiation of educational material in the form of assessment in points according to different components of content modules of the

discipline. At the end of semester, credit is passed orally with maximum score of 100 points. A group of teachers carries out the assessment.

11. Distribution of scores received by graduate students

Current testing and independent work				IWS	Total for moduls and IWS	Credit	Sum
Modul 1 -20 scores	Modul 2 - 15 scores	Modul 3 - 20 scores	Modul4- 15 scores				
3M1- 3M3	3M4- 3M5	3M6- 3M7	3M8- 3M10				
T1- T8	T10 - T11	T12- T14	T15-T17	15	85 (70+15)	15	100

Grading scale: national and ECTS

Total scores for all the educational activities	ECTS	National scale	
		For examination	For credit
90 – 100	A	excellent	credit
82-89	B	good	
74-81	C		
64-73	D	satisfactory	
60-63	E		
35-59	FX	Unsatisfactory with the possibility of reexamination	No credit with the possibility of reexamination
0-34	F	unsatisfactory with obligatory re-learning of the course	No credit with obligatory re-learning of the course

12. Methodical literature

1. Feeding of farm animals. Methodical instructions for conducting laboratory-practical classes and independent work. Sumy, 2013, 40 p.

13. Recommended literature

№	Kind	Title
1	Basic	Bogdanov G.A. Feeding of farm animals. - M .: Agropromizdat, 1990. - 620 p.
2		Detailed feeding norms for farm animals: Handbook / M.T. Nozdrin, M.M. Karpus, V.F. Karavashenko and others; Edited by M.T. Nozdrina. - K .: Urozhai, 1991. - 344 p.
3		Provatorov G.V., Provatorova V.O. Feeding of farm animals: A textbook. - Sumy: PH: University book, 2004. - 510 p.
4		Practical mannual on feeding of farm animals / I.I.Ibatullin, Yu.O.Panasenko, V.K. Kononenko and others. - K., 2003. - 432 p.
5		Provatorov G.V., Ladyka V.I. et al. Norms, rations and nutrition of foddors for different farm animals: A Handbook. - Sumy: PH University book, 2007. - 494 p
6		Norms and rations of farm animal feeding: Reference textbook. / A.P. Kalashnikov, N.I. Kleymenov, V.N. Bakanov et al. - M .: Agropromizdat, 1985. - 352 p.
7		Bogdanov G.A. Feeding of farm animals. - M .: Agropromizdat, 1990. - 620 p.
8		Bakanov V.M. Feeding of farm animals. - M .: Agropromizdat, 1989. - 511 p.
9	Additional	Durst L., Whitmtan M. - Trans. from German. – Edited by and with the preface of Ibatullin I.I., Provatorov G.V. - Vinnytsja, Nova Kniga, 2003. - 384 p.

10	Compound fodders, feed additives and SWM for animals (composition and application): Reference book / VA. Krokhina, A.P. Kalashnikov, V.I. Fisinin et al.; Edited by V.A. Crochina. - M.: Agropromizdat, 1990. - 304 p.
11	Waltham Book about feeding of domestic animals / Edited by I. Burger. - M.: Bioinformservice, 1995. - 189 p.
12	Kuna T.D. Feeding of horses. - M.: Kolos, 1983. - 352 p.
13	Vitamin nutrition of farm animals: Recommendations / L.M. Dvinskaia, L.V. Reshetova, M.V. Sorokin et al. - M.: Agropromizdat, 1989. - 72 p.
14	Bergner H., Ketz H.A. Scientific fundamentals of farm animal nutrition. M.: Kolos, 1973. - 597 p.
15	Arkhipov A.V., Toporova L.V. Protein and amino-acid nutrition of poultry. - M.: Kolos, 1984. - 175 p.
16	Dmitrochenko A.P., Pshenichny P.D. Feeding of farm animals. - M.: Kolos, 1975. - 480 p.
17	Feeding of pigs at farms of industrial type / I.S. Tronchuk, P.V. Voronjansky, M.T. Nozdrin et al. - K.: Urozhai, 1979. - 152 p.

14. Information resources

1. <http://www.abelavida.com/shop/agromach>
2. <http://www.agro-id.gov.ua>
3. <http://www.lol.org.ua>
4. <http://www.minagro.gov.ua>
5. <http://www.ukragroportal.com>
6. <http://www.zooinformatika.narod.ru/ssyl.html>