Information about the subject

Degree: Bachelor of Science Degree in Veterinary Medicine

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 1260408 **Name:** Nutrition and animal feeding

Credits: 6,00 **ECTS Year:** 4 **Semester:** 1

Module: Module of Animal Production

Subject Matter: Animal Production **Type:** Compulsory

Department: Animal Production and Public Health

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

Module of Animal Production

Subject Matter	ECTS	Subject	ECTS	Year/semester
Animal Production	30,00	Animal production and genetic improvement I	6,00	4/1
		Animal production and genetic improvement II	6,00	4/2
		Aquaculture	6,00	4/2
		Economy and Business in the veterinarian domain	6,00	3/2
		Nutrition and animal feeding	6,00	4/1

Recommended knowledge

To have slight knowledge of Anatomy, Biochemistry, Animal Physiology I and II and bases of Animal production.

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1	The student connects the theoretical and practical contents through projects and assignments.
R2	The student knows and understands with a critical attitude the concepts that are included in the syllabus/contents of the module of Nutrition and Animal Food.
R3	The student is able to solve problems related to the contents of the module.
R4	The student knows how to use different working techniques in the laboratory and interpret the results.
R5	The student is able to work at an animal feed formulation laboratory correctly performing the basic operations in both the planning and the development of each of the laboratory practices
R6	The student is able to write a comprehensible and organized text on various aspects of animal nutrition in the veterinary field.
R7	The student searches bibliographic information from different sources and knows how to analyse it with a critical and constructive spirit.
R8	The student argues according to rational criteria based on his or her work.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB2	Capacity to apply knowledge to work or occupation in a professional way and have the competences that are proved by preparing and arguing topics and problem-solving in their specific field of study.				x
CB3	Capacity to gather and interpret relevant data usually within their specific field of study and capacity to make judgments that include reflection on relevant social, scientific or ethical issues.				x
CB4	Capacity to communicate information, ideas, problems and solutions at specialist and non-specialist levels.			x	
CB5	Capacity to develop those learning skills needed to undertake further studies with a high degree of autonomy.				x

GENERAL		Weighting			
		1	2	3	4
CG0	Capacity to speak well in public.				x
CG3	Understanding and applying control of animal breeding, management, health, reproduction, protection, and feed as well as improving production.				x
CG4	Understanding and applying methods and processes for obtaining efficient animal products under optimal conditions and costs, and assessing environmental impacts.		x		
CG5	Understanding and applying laws, regulations and administrative provisions in all areas of the veterinary profession and public health, understanding the ethical implications of health in a changing global context.			x	
CG6	Developing professional practice, acquiring skills related to teamwork, with an efficient use of resources and quality management.			x	

CG7	Identifying emerging risks in all areas of the veterinary profession.		x		

SPECIFIC		Weighting			
		1	2	3	4
E44	Knowing and applying the basics of animal production: traditional and modern systems.			x	
E45	Knowing and applying raw materials for animal feeding: characteristics, production and preservation.				x
E46	Knowing and applying the basics of animal nutrition, ration formulation and feed manufacturing.				x

TRANSVERSAL		Weighting			
		1	2	3	4
T1	Capacity of analysis, synthesis, implementation of knowledge for problem-solving and decision-making.				x
T2	Understanding and applying the scientific method to professional practice including evidence-based medicine.			x	
T4	Mastering fluency in oral and written mother tongue communication, listening and responding effectively using a language appropriate to audience and context.				x
T6	Using information technology to communicate, share, search for, collect, analyze and manage information, especially related to the veterinarian practice.		x		
T7	Ability to adapt to new situations, self-critical ability, being aware of personal limitations and understanding when and where seeking and obtaining advice and professional help.			x	
T8	Efficient and effective work, both independently and as a member of a multidisciplinary team or unit, showing respect, appreciation and sensitivity to the work of others.			x	
T9	Keeping an ethical behaviour in the exercise of given responsibilities toward the profession and society.			x	
T10	Ability to learn, to research, and to be aware of the need to keep knowledge updated, and attending training programs.			x	

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R5, R7	60,00%	Written assessment of acquired knowledge and skills. The test may consist of a series of open-ended questions or multiple-choice questions about the theoretical contents of the module and/or practical exercises (problem-solving).
R1, R2, R3, R4, R7	5,00%	Evaluation of the use of the practical lessons in the classroom, of problems or computer science, seminars and tutorials, by means of participation, computer-supported problem solving and the elaboration of the corresponding reports.
R1, R2, R3, R4, R7	10,00%	Evaluation of the practical laboratory work, which must demonstrate the competences acquired by the student and his or her ability to use them to solve the different situations and problems that arise in a laboratory; this assessment may consist of one of the following methods, or a combination of several of them: an individual written test, the individual or group performance of a laboratory experience, the delivery of an individual or group report on the work carried out in the laboratory.
R1, R2, R3, R4, R7	5,00%	Evaluation of practical work in a clinic through which the student must demonstrate the competences acquired and the ability to use them to solve the different situations and problems that arise in a clinic; this assessment may involve one of the following methods, or a combination of several of them: a written individual test, the individual or group performance of a clinical experience, the delivery of an individual or group report on the work carried out in the laboratory.

R1, R2, R5, R6, R7	15,00%	Evaluation of group work through a system of continuous assessment throughout the course based on the delivery of assignments the objectives and content of which will be proposed by the teacher.
R1, R2, R3, R4, R5, R6, R7	5,00%	Evaluation of activities in which the student must do some research individually and structure information related to each of the topics through a system of continuous assessment throughout the course based on the delivery of papers, the objectives and contents of which will be proposed by the teacher.

Observations

The minimum to approve the subject is a mark of **5 points**. The average mark must be equal to or greater than **50 %** in the **"Assessment of written"**, **"Evaluation of the practical work" and "Evaluation of the practical work in clinic"**

This course is not eligible for single evaluation. According to the general evaluation and qualification regulations, the preferred evaluation system will be continuous evaluation.
Attendance at practical sessions is mandatory.
The use of artificial intelligence (AI)-based tools is subject to the discretion of the teacher, who may establish specific limits or conditions depending on the training or assessment activity.

MENTION OF DISTINCTION:
In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1 On-site training activity aimed primarily at acquiring knowledge acquisition skills. It is characterised by the fact that students are spoken to. Also called master class or exposition, it refers to the oral presentation made by the teacher, (with the support of blackboard, a computer and a projector for the display of texts, graphs, etc.), in front of a group of students. They are expository, explanatory or demonstrative sessions of contents. The size of the group is determined by the limit or physical capacity of the classroom; therefore, it is a single group.

M2 On-site training activity aimed primarily at obtaining knowledge application and research skills. Knowledge is built through interaction and activities. The activity consists of supervised monographic sessions with shared participation (teachers, students, experts). The size of the group is variable, from one large group to various small groups, with a minimum of 6 students to ensure interaction. The evaluation will be based on follow-up records kept by the teacher. Participation and the development of the capacity to problematize should be taken into account.

M3 On-site group-work training activity oriented toward problem solving under the supervision of a teacher. It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students, to differentiate it from a master class.

M4 On-site training activity in groups that takes place in the classroom. It includes working with documents and formulating ideas without handling animals, organs, objects, products, or corpses (e.g., work with articles or documents, clinical case studies, diagnostic analyses, etc.). It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M5 On-site training activity in groups that takes place in the Computer Lab where the computer is used as support for learning. It includes work with computer models, specific software, Web queries, etc. It would correspond to "Animal-free supervised practical work", type e1, from the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M6 On-site training activity in groups carried out in the laboratory. It includes the sessions where the students develop laboratory experiments, make dissections or use the microscopes for the study of histological or histopathological samples actively and autonomously, under the supervision of the professor. It also includes work with healthy animals, objects, products, corpses (e.g., animal handling, bacteriological practices, physiology or biochemistry, meat inspection, etc.). It would correspond to the "Supervised practical non-clinical animal work" type e2 of the European evaluation of EAEVE. The size of the group is variable, in a range of 10 to 20 students.

M7 On-site training activity that is defined as the clinical practical work developed in the Veterinary Clinical Hospital or clinical centres ascribed to the University, as well as itinerant clinical practices, mainly with ruminants, equids, pigs, birds and aquatic animals. Also included are necropsies, surgical workshops and training in clinical examination techniques or diagnosis with healthy patients. In these practical sessions the student will always work with animals, which can be healthy (e.g. propaedeutic or obstetrics) or clinical cases (individual or collective), including a protocol or work scheme, being supervised by a teacher and assuming the provision of a service. This type of training corresponds to type e3 of the EAEVE European evaluation called "Clinical Training" (strickly hands-on)". The size of the group will be 5 students or fewer.

M8 A set of on-site training activities carried out by the teacher to provide personalised attention to the student or in small groups with the aim of reviewing and discussing the materials and topics presented in classes, seminars, readings, carrying out projects, etc. The aim is to ensure a truly comprehensive education of the student rather than a mere transfer of information. It is, therefore, a personalized assistance relationship in which the tutor assists, facilitates and guides one or more students in the learning process.

M9 Set of processes that attempt to evaluate the learning outcomes of students expressed in terms of acquired knowledge, capacities, skills or abilities developed and manifested attitudes. It covers a wide range of activities that can be developed for students to demonstrate their training (e.g. written, oral and practical tests, projects or assignments). It also includes the Official Calls.

M10 Autonomous training activity, including activities and coursework, bibliographic searches. The results obtained from unsupervised group and teamwork will be evaluated, with particular attention paid at the time of evaluation to the acquisition of specific knowledge development skills through group work.

M11 Autonomous training activities related to personal study, or the preparation of individual course assignments. The individual preparation of readings, essays, problem solving, papers, reports, etc. will be evaluated through presentations or submissions during theoretical classes, practical classes, seminars and/or tutorials. The evaluation of the submitted papers will consider the structure of the paper, the quality of the documentation, originality, spelling and presentation.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical lessons (TL) M1	R1, R2, R3, R4, R7	35,00	1,40
Seminars (S) M2	R1, R2, R5, R6, R7	2,00	0,08
Problem-solving Practice (PSP) M3	R1, R2, R3, R4, R5, R6, R7	5,00	0,20
In-Classroom Practice (ICP) M4	R1, R2, R3, R4, R5, R6, R7	5,00	0,20
Computer Practice (CoP) M5	R1, R2, R3, R4, R5, R6, R7	5,00	0,20
Laboratory Practice (LP) M6	R2, R3, R4	4,00	0,16
Tutorial M8	R2, R7	2,00	0,08
Evaluation (Ev) M9	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group work M10	R1, R2, R5, R6, R7	50,00	2,00
Individual work M11	R1, R2, R3, R5, R6, R7	40,00	1,60
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
UD1. Introduction to Animal Nutrition	T-1. Introduction to Animal Nutrition.
UD2. Nutrients. Chemical composition of the aliments.	T-2. Chemical composition of food. Introduction. Notions of food. The main components of food. Water, Carbohydrates, Lipids, Proteins, Vitamins and Minerals. T-3. Analysis of foods. Introduction. Analysis Weende / Van Soest. Other complementary analysis.
UD3.- Foods.	T-4. Classification of foods. Introduction. Energetic concentrates. Protein concentrates. Grass and forage crops. T-5. Energetic concentrates. Cereals, cereal by-products, fats and oils. Advantages and disadvantages of its use. T-6. Protein concentrates. Vegetal concentrates: oilseed cakes and meals; leguminous seeds. Animal protein concentrates. Non-protein nitrogen compounds. Synthetic amino acids. Milk products. T-7. Grass and forage crops. Green crops. Factors that change the nutritional value of the crops. Conserved crops: haymaking, drying and silage. T-8. Additives for animal food. Introduction. Antibiotics. Probiotics. Enzymes. Organic acids. Modifiers of rumen fermentation.

UD4. – Digestion and Metabolism.	T-9. Digestion in monogastric mammals. Introduction. Anatomy digestive tract. Digestion: mouth, stomach, small and large intestine. Differences between young pig-fowl. Absorption of digested nutrients: Carbohydrates, Lipids, Proteins, Vitamins and Minerals. T-10. Microbial digestion in ruminants. Anatomy and physiology of ruminant digestion. Rumen microorganisms. Digestion of carbohydrates, proteins and lipids. Dynamic of digestion in the ruminant. Control and modification of rumen fermentation. T-11. Evaluation of foods: digestibility. Introduction. Measurement of digestibility. Methods for measuring digestibility. Factors affecting digestibility.
UD5. – Energetic nutrition.	T-12. Energy content of foods. Demand for energy. Supply of energy: GE, DE, ME, NE, heat increment of foods and energy retention. Animal indirect/direct calorimetry. Measurement of energy retention by the carbon and nitrogen balance technique; measuring energy retention by the comparative slaughter technique. Utilisation of metabolisable energy for maintenance, growth and production. T-13. Systems for expressing the energy value of foods. Introduction. Energy systems and energy models. Energy systems for ruminants. Energy systems for pigs and poultry. Predicting the energy value of foods.
UD6. – Protein nutrition	T-14. Evaluation of foods: protein. Introduction. Crude protein. Digestible crude protein. Determination of endogenous nitrogen. Measures of protein quality for monogastric animals and ruminant animals. The UK metabolisable protein system.

UD7. – The nutrient requirements of animals.	T-15. Nutrient requirements for maintenance. Introduction. Basal and fasting metabolism. Trials food. Factors that modify the energy requirements for maintenance. Protein requirements for maintenance. T-16. Nutrient requirements for growth. Introduction. Protein requirements for growth. Nutritional control of growth. T-17. Feeding standards for reproduction. Introduction. Nutrition and the initiation of reproductive ability. Nutrition and age of first coverage. Plane of nutrition, fertility and fecundity. Nutrition and the growth of the foetus. Egg production in poultry. T-18. Nutrient requirements for Lactation. Introduction. Sources of milk constituents: milk proteins, lactose, milk fat, vitamins and minerals. Nutrient requirements for milk production depending on the amount of milk being produced and its composition. Energy and protein requirements.
UD8. – Food intake.	T-19. Regulation of food intake. Introduction. Food intake in monogastric animals. Short-term regulation: chemostatic theories and thermostatic theory. Long-term regulation. Sensory appraisal. Physiological factors. Nutritional deficiencies. Food intake in ruminants. Food characteristics that determine intake (animal and environmental factors). Prediction of food intake.

Organization of the practical activities:

	Content	Place	Hours
PR1.	Identification of different raw materials for animal food.	Laboratory	2,00
PR2.	Visit to an animal food factory.	Technical visit	4,00
PR3.	Seminar for solving problems of nutrient requirements and evaluation of foods.	Lecture room	4,00
PR4.	Introduction to the formulation	Computer	3,00
PR5.	Oral explanation of scientist work	Lecture room	5,00

Temporary organization of learning:

Block of content	Number of sessions	Hours
UD1. Introduction to Animal Nutrition	2,00	4,00
UD2. Nutrients. Chemical composition of the aliments.	4,00	8,00
UD3.- Foods.	4,00	8,00
UD4. – Digestion and Metabolism.	4,00	8,00
UD5. – Energetic nutrition.	3,00	6,00
UD6. – Protein nutrition	2,00	4,00
UD7. – The nutrient requirements of animals.	7,00	14,00
UD8. – Food intake.	4,00	8,00

References

Bach, A.; Fernández, C.; Terre, M. Normas FEDNA para la formulación de piensos: rumiantes de recría; rumiantes de leche; rumiantes de cebo; pollos de carne y aves de puesta; ganado porcino. Fundación Española para el Desarrollo de la Nutrición Animal. 2010.

Fekete, S. Gy. Veterinary Nutrition and Dietetics. Pro Scientia Veterinaria Hungarica. 2008.

McDonald, P; Edwards, R.A.; Greenhalgh, J.F.D. Nutrición animal.7ª ed. Zaragoza-Acribia. 2010.

Wu, G. (2017). *Principles of animal nutrition*. crc Press.