

**Información del Plan Docente**

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	105 - Facultad de Veterinaria
<b>Degree</b>	451 - Degree in Veterinary Science
<b>ECTS</b>	6.0
<b>Year</b>	2
<b>Semester</b>	Second semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

**1.General information****1.1.Introduction****1.2.Recommendations to take this course****1.3.Context and importance of this course in the degree****1.4.Activities and key dates****2.Learning goals****2.1.Learning goals****2.2.Importance of learning goals****3.Aims of the course and competences****3.1.Aims of the course****3.2.Competences****4.Assessment (1st and 2nd call)****4.1.Assessment tasks (description of tasks, marking system and assessment criteria)****5.Methodology, learning tasks, syllabus and resources****5.1.Methodological overview**

The learning process designed for this subject is based on an in-person attendance part, which will be structured in 42 lecture classes of theory of 50 minutes length, and 18 practical classes, divided in 10 classes of practical nutrition cases to be resolved in class (5 sessions of 2 hours), 6 hours of practice in laboratory and 2 h of databases management in computer.

The list of topics included in the theory program is divided into two sections, Nutrient evaluation and Requirements, with

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28 and 14 h, respectively. Associate documentation (including concepts in theory, examples and supporting graphics and images) will be available for the students one week in advance, by means of the ADD. Classes of practical cases will include problems to be solved in group, to give support to the theory concepts giving in class. Laboratory practices will consist on microscopy inspection for identification of ingredients in feed, and will be combined with basic notions of management of tables of requirements and nutrient databases.

### 5.2.Learning tasks

### 5.3.Syllabus

Program of lecture classes of theory:

Lesson 1. Concept of Nutrition. Bases and objectives of animal nutrition. Chemical composition of feeds and animal body. (1 h)

Lesson 2. Feeds 1. Classification based on chemical composition. Components of plant cell content and cell wall. Fibrous feeds. Feeds rich in non-structural carbohydrates. (2 h)

Lesson 3. Feeds 2. Nitrogen-rich vegetal and animal feeds. Fats. (2 h)

Lesson 4. Feeds 3. Vitamines. Minerals. Additives. (2 h)

Lesson 5. Rumen microbial ecosystem. Microbiology. Microbial degradation of fibre. Protein utilization. Rumen biohydrogenation of fatty acids. (2 h)

Lesson 6. Digestibility. Digestibility in different sites of the digestive tract. Apparent and real digestibility. Methods of determination. (1 h)

Lesson 7. Factors affecting digestibility. Composition, associative effects, effect of feed processing. Animal species, physiological stage, level of feeding. (2 h)

Lesson 8. Energy evaluation. Energy partition of feeds. Physiological combustion values. (1 h)

Lesson 9. Utilization of metabolizable energy for different physiological functions: factors. Energy costs of fat and protein synthesis. Energetic efficiency of storage and mobilization of energy reserves. (2 h)

Lesson 10. Energy evaluation systems for monogastric animals. Systems based on digestible, metabolizable or net energy. Predicting energy value of feeds. (1 h)

Lesson 11. Energy evaluation systems for ruminants. British system and variable net energy system. INRA system. NRC system. (3 h)

Lesson 12. Protein evaluation for monogastric animals. Concept of limiting aminoacid. Aminoacid availability and estimation. Evaluation methods. (1 h)

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Lesson 13. Protein evaluation for ruminants. Potential and effective rumen degradability of protein. Factors affecting protein rumen degradability. (1 h)

Lesson 14. Microbial protein synthesis: efficiency and factors affecting. Protein-energy interactions in ruminants. Value of protein reaching the duodenum. (1 h)

Lesson 15. Protein evaluation systems for ruminants. ARC systems. INRA system. CNPS system. (2 h)

Lesson 16. Voluntary feed intake. Intake regulation in monogastric and ruminant animals. Potential feed intake and ingestibility. Factors affecting feed intake. (1 h)

Lesson 17. Estimation of voluntary intake. Factors affecting feed intake. Fill units and rumen fill value. (2 h)

Lesson 18. Requirements and nutrient input. Energy requirements for maintenance. Basal and fasting metabolism. Energy cost of activity in animals. (1 h)

Lesson 19. Environmental effect on energy needs for maintenance. Thermoregulation. Interval of neutral temperature. Critical and critical effective temperature. (1 h)

Lesson 20. Protein requirements for maintenance. Faecal metabolic nitrogen and urinary endogenous nitrogen. Methods of determination. (1 h)

Lesson 21. Growth and development in the different animal species. Body composition and feeding. Compensatory growth. (2 h)

Lesson 22. Energy and protein requirements for growth and fattening: monogastric and ruminant animals. Factors affecting energy and protein requirements for growth and fattening . (3 h)

Lesson 23. Reproduction. Requirements of reproductive females in the different animal species. Requirements of reproductive males during mating periods. Requirements for egg production. (2 h)

Lesson 24. Requirements in pregnancy. Growth of gestating uterus and foetal nutrition. Effects of the level of feeding on different stages of pregnancy. Particularities of the different species. (2 h)

Lesson 25. Lactation. Origin of milk components. Factors affecting milk production and composition. Energy and protein requirements of the milking cow. Effects of feeding on milk production and composition. (3 h)

### 2: Practical classes:

Practical class 1. Identification of feeds. Feed microscopy. (6 h)

Practical class 2. Management of software for feed rationing (Winfeed) (2 h)

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Practical class 3 (Solving practical cases/nutrition problems) - 2 Groups per session, 5 sessions of 2 h

- Nº hours/student: 10

### 5.4.Course planning and calendar

*The schedule and main features of the subject will be described in detail, together with the other subjects of the Degree in Veterinary Science, in the web page of the Faculty of Veterinary Science ( <http://veterinaria.unizar.es/gradoveterinaria/> ). Such link will be actualized at the start of the course.*

### 5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Blas Beorlegui, Carlos de. Nutrición y alimentación del ganado / Carlos de Blas Beorlegui, Gonzalo González Mateos, Alejandro Argamenteria. Madrid : Mundi-Prensa, 1987
- [BB] Bondi, Aron A.. Nutrición animal / Aron A. Bondi ; con la colaboración parcial de David Drori ; traducido por Rafael Sanz Arias . Zaragoza : Acribia, D.L. 1989
- [BB] Nutrición animal / P. McDonald ... [et al.] . 7ª ed. Zaragoza : Acribia, 2013
- [BC] Alimentación de bovinos, ovinos y caprinos / obra colectiva dirigida por J.[i.e.R.] Jarrige ; versión española de Javier González Cano . Madrid : Mundi-Prensa, 1990
- [BC] Alimentación de los animales monogástricos : cerdo, conejo, aves / Obra colectiva redactada por investigadores e ingenieros del Département de l'Élevage des Monogastriques bajo la responsabilidad de Jean-Claude Blum ; versión española de M.J. Fraga Fernández-Cuevas, con la colaboración de J. Alegre-Alvaro . Madrid : Mundi-Prensa, 1985
- [BC] Close, W.H.. Nutrition of Sows and Boars / W.H. Close , D.J.A. Cole . 1st ed., [1st]reimp. Nottingham : University Press , 2000 (reimp.2001)
- [BC] Combs, Gerald F.. The vitamins : fundamental aspects in nutrition and health / Gerald F. Combs . 2nd ed San Diego [etc.] : Academic Press, cop. 1998
- [BC] Leeson, Steven. Nutrition of the chicken / Steven Leeson and John D. Summers. 4th. ed. Guelph (Ontario) : University Books , 2001
- [BC] Maloney, Beth. Nutrition and the feeding of horses / Beth Maloney . Shrewsbury (England) : Swan Hill Press , 1997
- [BC] Necesidades energéticas y proteicas de los rumiantes : manual de consulta preparado por el Comité Técnico sobre respuestas a los nutrientes del AFRC / compilado por G. Alderman con la colaboración de B. R. Cottrill ; traducido por Rafael Sanz Arias . Zaragoza : Acribia, D. L. 1996
- [BC] Nutrición canina y felina : guía para profesionales de los animales de compañía / Linda P. Case [et al.] ; [revisión, [de la edición en español]... Manuel Rodríguez Sánchez] . 2a. ed. Madrid [etc.] : Harcourt, D.L. 2001
- [BC] Nutrient requirements of beef cattle / Committee on Nutrient requirements of Beef Cattle, Board on Agriculture and Natural Resources, Division on Earth and Life Studies . 8th rev. ed. Washington : National Academy Press , 2016
- [BC] Nutrient requirements of cats / Subcommittee on Cat Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . [1st. ed.], rev. Washington : National Academy Press , 1986
- [BC] Nutrient requirements of dairy cattle / Subcommittee on Dairy Cattle Nutrition, Committee on Animal Nutrition, Board on Agriculture and Natural Resources, National Research Council . 7th rev. ed. Washington : National Academy Press, 2001
- [BC] Nutrient requirements of dogs / Subcommittee on Dog Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . [1st. ed.], rev. Washington : National Academy Press , 1985
- [BC] Nutrient requirements of horses / Subcommittee on Horse Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . 5th rev. ed. Washington : National Academy Press , 1989

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- [BC] Nutrient requirements of poultry / Subcommittee on Poultry Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . 9th rev. ed. Washington : National Academy Press , 1994
- [BC] Nutrient requirements of rabbits / Subcommittee on Rabbit Nutrition, Committee on Animal Nutrition, Board on Agriculture and Renewable Resources, National Research Council . 2nd rev. ed. Washington : National Academy Press , 1977
- [BC] Nutrient requirements of sheep / Subcommittee on Sheep Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . 6th rev. ed. Washington : National Academy Press , 1985
- [BC] Nutrient requirements of swine / Subcommittee on Swine Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council . 10th rev. ed. Washington : National Academy Press , 1998
- [BC] Suttle, Neville F.. Mineral nutrition of livestock / Neville F. Suttle . 4th ed. Wallingford, Oxon : CABI , cop.2010
- [BC] The nutrient requirements of ruminant livestock / technical review by an agricultural research council working party published on behalf of the Agricultural Research Council by the Commonwealth Agricultural Bureaux . [1st.ed.], repr. Wallingford (Oxon, UK) : CAB International , 1990
- [BC] The nutrition of the rabbit / edited by C. de Blas and J. Wiseman . 2nd ed. Wallingford; New York : CABI Publishing, 2010
- [BC] Underwood, Eric Jon. Los minerales en la nutrición del ganado / Eric J. Underwood y N. F. Suttle ; traducción de Josep Gasa Gasó, José Francisco Pérez Hernández . 3ª ed. Zaragoza : Acribia, D.L. 2003