

## 28419 - Animal Nutrition

### Syllabus Information

**Academic Year:** 2020/21

**Subject:** 28419 - Animal Nutrition

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 451 - Degree in Veterinary Science

**ECTS:** 6.0

**Year:** 2

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:** ---

### 1. General information

#### 1.1. Aims of the course

The aim of this course is for students to acquire basic knowledge of the nutrients provided by foods and the factors that determine their digestive and metabolic use, in order to assess their efficiency of use. It also includes the definition and assessment of the needs of domestic animals in their different physiological phases and the analysis of the different feeding systems that allow them to be satisfied. It is intended that the achievement of these objectives will facilitate the understanding and construction of their own knowledge in the other disciplines of the degree.

In addition, the students are encouraged to participate actively in their learning process, involving them on it and moving them away from the mere role of passive observers.

#### 1.2. Context and importance of this course in the degree

Knowledge of the nutritional value of food and of its digestive use to satisfy the nutritional needs of animals in their different physiological phases should be used to understand and establish feeding patterns that define the systems of rearing and production of animals in production, which will be taught in the 4th year subjects corresponding to the *Integrations in ruminants, pigs and birds and rabbits*, and which favour the correct development and welfare of pets and sport, addressed in the 4th year subjects corresponding to the *Integrations in pets, equids and aquatic and exotic animals*. Likewise, the knowledge and skills acquired may be applied in the corresponding *Practicum*, to be developed in the 5th year of the Degree.

#### 1.3. Recommendations to take this course

It is recommended to have studied Biology and Biochemistry in the First Course of the Veterinary Degree, and Agronomy in the First Quarter of the Second Course. In addition, it is recommended to be enrolled in the subject of Animal Physiology (Second Course of the Degree in Veterinary Medicine). In this case, although this subject, of an annual nature partially coincides in time with that of Animal Nutrition (located in the 2nd quarter of the 2nd year), the knowledge acquired throughout the 1st quarter and simultaneously during the 2nd quarter, will contribute significantly to the understanding of the concepts of Animal Nutrition to be taught.

### 2. Learning goals

#### 2.1. Competences

On successful completion of this course, students will be able to:

1. Identify and evaluate different foods, in terms of chemical composition and bromatological characteristics.
2. To estimate the components that determine the nutritional needs of domestic animals in their different physiological phases.
3. Understand the role of food in meeting the needs of animals, and in preventing metabolic or health problems.
4. Understand the impact of food on the quality of animal products.
5. To know the different systems of feeding of the domestic animals.
6. Make communication more correct and effective, both orally and in writing.
7. To improve the capacity for autonomous organization and planning of work and information management.

#### 2.2. Learning goals

If students complete the course successfully, they should be able to

1. Have a basic knowledge of the nutrients provided by food, and is able to characterize and typify the main raw materials.
2. Understand the metabolic processes involved in the digestive utilization of foods, and is able to assess their utilization efficiency.
3. Have knowledge of determining the needs of animals in their different physiological phases.
4. Understand the methods and systems of food valuation and has basic concepts of its application to the satisfaction of the nutritional needs of animals.
5. This includes the influence of food on the quality of products of animal origin.
6. Work as a team, synthesize available information on a subject, present and substantiate his opinion on the subject and present it publicly, both orally and in writing.

## 2.3. Importance of learning goals

The learning results contribute to the capacity of the students to face in better conditions the subjects included in the different Integrations by species. This will help the students to carry out their professional profile in farms and companies linked to animal production, as well as in the approach and resolution of clinical cases and the maintenance of optimal conditions of maintenance and development that guarantee the welfare of the animals. In addition, they will allow interrelation and teamwork with other professionals in the technical sciences (agricultural engineers, food technicians) or biomedical (doctors, biologists, ecologists).

On the other hand, the strengthening of the generic or transversal competences of instrumental type, of interpersonal and systemic relation will contribute, together with the rest of subjects, to the integral formation of the future Veterinary Graduates.

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

#### Evaluation activities

The student must demonstrate that has achieved the intended learning outcomes through the following assessment activities:

1. **Written assessment test:** Theoretical knowledge will be assessed by means of a written test, which will be carried out in two partial examinations, each covering approximately half of the subject. The first written test, of a voluntary nature, will be carried out in the middle of the term, and the second at the end of the teaching term. The tests will consist, each of them, of a total of 25 questions covering conceptual issues, both short and 4 alternative and true/false, and 3 other practical case solution questions and problems of a methodological nature.

Passing this test will accredit the achievement of learning outcomes 1 to 5, and will be evaluated according to the criteria and levels of requirement described in the corresponding section. In the case of passing the first partial test with a score equal to or higher than 5 out of 10, the student may appear in the two official announcements of the subject only to the second assessable part; otherwise, must do so for the entire subject. The final grade of the written tests will be from 0 to 10, and will suppose 80% of the final grade of the student in the subject. The total duration of this written test will be about 3 hours.

1. **Individual work:** The individual written submission of a report on the nutritional value of a conventional ingredient in animal feed shall be evaluated. Passing this test will accredit the achievement of learning outcomes 1, 2, 4 and 5, and will be evaluated according to the criteria and levels of requirement described in the corresponding section. The grade will be from 0 to 10, and will be 5% of the student's final grade in the subject.
2. **Teamwork 1:** The written submission of a report on the nutritional value of various commercial small animal feeds will be assessed on the basis of their declared chemical composition, which the pupils will prepare in groups of 2 students. Passing this test will accredit the achievement of learning outcomes 1, 2, 4 and 6, and will be evaluated according to the criteria and levels of requirement described in the corresponding section. The grade will be from 0 to 10, and will be 5% of the student's final grade in the subject.
3. **Teamwork 2:** In addition to the previous work, a test will be evaluated regarding the practices carried out, with groups of 2-3 students, considering also the individual attendance to the practical classes. Passing this test will accredit the achievement of learning outcomes 1, 2, 3, 4, 5 and 6, and will be assessed according to the criteria and levels of requirements described in the corresponding section. The grade will be from 0 to 10, and will represent 10% of the student's final grade in the subject.

#### Valuation criteria and requirement levels

- **Written final assessment test:** a minimum score of 4.5 out of 10 is required.
- **Teamwork 1:** Clarity and precision in the use of language will be valued, as well as the ability to synthesize and the

relevance of the contents.

- **Individual work:** the understanding of the concepts acquired in the practices and their application to a specific case will be valued.
- **Teamwork 2:** The work done will be valued, applying the same criteria as in points 2 and 3. In addition, attendance at practical classes will be considered.

The assessment of individual and team work 1 and 2 (points 2, 3 and 4) will only be considered for the grade of the subject if in the final written test, a minimum grade of 4.5 points out of 10 has been obtained. In order to pass the subject, it will be necessary to obtain a minimum final grade of 5 out of 10.

#### **Marking system:**

According to the national regulation Law 1025/2003, 5th of September which lays down the European system of credits and marking system for the university degree.

0-4,9: FAIL.

5,0-6,9: PASS

7,0-8,9: GOOD (NT).

9,0-10: EXCELLENT (SB).

As the article 158 of the Statutes of the University of Zaragoza lays down, provisional grades will be displayed at least for 7 days and students will be able to review them on the date, time and place provided for that purpose.

## **4. Methodology, learning tasks, syllabus and resources**

### **4.1. Methodological overview**

The learning process designed for this subject is based on an in-person attendance part, which will be structured in 42 lectures 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 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.

### **4.2. Learning tasks**

#### **1: Lecture classes and 2: Practical classes**

### **4.3. Syllabus**

#### **1: Lecture classes:**

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)

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 uterous 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:**

Identification of feeds. Feed microscopy. (6 h)

Management of software for feed rationing (Winfeed) (2 h)

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

- Nº hours/student: 10

### **4.4. 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.

### **4.5. Bibliography and recommended resources**