

Academic Year/course: 2022/23

## 28429 - Ruminant Integrated Course

### Syllabus Information

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**Academic Year:** 2022/23

**Subject:** 28429 - Ruminant Integrated Course

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

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

**ECTS:** 14.0

**Year:** 4

**Semester:** Annual

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

The general aim of this subject will be the learning of the main aspects on which the Production, Clinic and Health of Ruminants is based. To achieve this general objective, the specific learning objectives of the subject will focus on achieving that the student is able to know, understand and / or apply:

- The bases of animal production: traditional and current systems.
- The raw materials essential for the feeding of ruminants.
- The bases of animal nutrition, rations formulation and feed manufacturing.
- Genetic applications to programs of improvement and health.
- Reproductive strategies and procedures applied to production.
- The fundamentals of livestock facilities and environmental hygiene.
- The economy of the productive process and commercialization.
- Sustainable development
- Childbirth and puerperium: care and associated pathologies.
- The methods and procedures of clinical examination and its interpretation.
- The etiology of the different pathologies that affect the different devices or systems of ruminants.
- Diagnostic procedures for diseases: clinical, anatomopathological or laboratory.
- The different methods of fight against diseases of ruminants, both preventive and curative, including medical, surgical or hygienic-dietary treatments appropriate to each one of them.
- The diseases of ruminants transmissible to man and diseases of compulsory declaration, with special veterinary interest, including their diagnosis, control methods and legal approaches that regulate them.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of learning results of subject provides training and competence to contribute to its achievement.

It will try to promote that all students acquire the theoretical and practical knowledge necessary to develop transversal sustainability skills, so that they can contribute by promoting changes in farm management and the way of working to make them more sustainable. The cognitive, socio-emotional and behavioral learning outcomes acquired are focused on enabling our students to address the particular challenges of the SDGs raised, thus facilitating their achievement. They would be the following:

#### 2. Zero hunger:

Within this framework, the content of the subject tries to expose the different livestock production systems, promoting sustainable systems that allow resources to be used well and genetic diversity to be optimized to

adapt them to the needs of each area so that the results are the better and to be able to contribute to greater food availability (goal 2.4.).

### 3 . Health and well-being :

Part of the agenda focuses on the treatment of diseases that may be of importance to human health (zoonoses), so that they are aware of the importance of preventive measures that must be taken. In this sense, the One Health approach is very relevant since animal health and well-being go hand in hand with human health and well-being (goal 3.3.). On the other hand, it is about showing students the tools to safeguard their health (occupational risk prevention), showing them, for example, the appropriate clothing to carry out certain practices in safe conditions. This is relevant for their professional future, since it establishes healthy work habits (goals 3.9 and 3.D)

### 4 . Quality education :

Through the different theoretical-practical activities that are carried out in the subject, teamwork is promoted, making them see that collaboration is essential to obtain optimal learning results, and that collaborative learning, in addition to being stimulating, is a way to establish a lifestyle for the future, with a view to the work they are going to develop. Education and a participatory attitude are essential to guarantee an entrepreneurial spirit and decent work (goals 4.4 and 4.7)

### 5. Gender equality:

The subject tries to motivate those who take it in the same way, making them see that their sexual condition is not an impediment to developing the acquired skills in the future. It is about promoting their concerns and channeling them whatever their condition, giving them the necessary support to do so from respect. It is the attitude that we try to transfer and encourage at all times (goal 5.5).

### 7. Affordable and clean energy:

We want them to be aware of the different types of existing livestock farms, to analyze their needs and determine if it is possible to resort to the use of renewable energies in the context in which they carry out their work, in order to promote more sustainable systems, contributing to a less environmental impact (goal 7.2)

### 8. Decent work and economic growth:

The subject tries to provide the necessary tools so that they can decide the job they want to do in the future, placing value on it and trying to make it a quality job, since it is the basis for a consolidated economy. In various activities they are shown how the veterinary profession works with ruminants, such as visits to farms or talks given by professionals who show them how the sector is currently so that they can direct their professional future (goal 8.5).

### 9. Industry, innovation and infrastructure:

The knowledge acquired in the subject tries to provide the basis for establishing innovative and sustainable production systems. Today the use of renewable energy is of utmost importance to contribute to environmental health. We must try to make students aware of this important point, trying to reduce the environmental impact as much as possible, as long as it is feasible in the area in which each one develops their work. With the livestock surveys that they carry out, they can verify what type of actions of this type are carried out in the livestock farms that they value and be aware of the possibilities for improvement, if any (goal 9.4).

### 12. Responsible production and consumption:

Consumption habits have changed and future veterinarians must be aware of this. Meeting these needs involves adapting animal production systems, especially respecting animal welfare, which has become a priority. Knowing how to maintain said well-being is fundamental, also doing it while respecting the environment as much as possible and generating the least amount of waste possible during the performance of the professional activity. In the event that waste is generated, whatever its origin, correct management of the same is encouraged, to reduce the environmental impact that it may have or even its use for other areas. On the other hand, optimizing the use of medicines for the treatment of our animals is a way of contributing to their responsible use. For this, it is essential to know the pathologies that they may suffer, their pathogenesis, course and diagnosis (goals 12.2, 12.4, 12.5, 12.8)

### 13. Climate Action

The levels of carbon dioxide and other greenhouse gases in the atmosphere have been increasing in recent years. A deep and systemic change must be carried out towards a more sustainable economy. That is why it is interesting to work on alternatives such as increasing the demand for locally produced ruminant meat. With this, it is possible to minimize the consumption of external energy (transport, fuel, work) in order to reduce pollution and make the product cheaper.

### 15. Life of Land:

The health of the ecosystems we depend on is deteriorating faster than ever, affecting livelihoods, food security, health and quality of life.

For this reason, the possibilities that exist in ruminant farming will be considered to avoid soil degradation and ensure the

conservation of mountain ecosystems in order to improve their ability to provide essential benefits for sustainable development (goals 15.3, 15.4)

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

The subject "Integration: Ruminants", like the rest of integration subjects, is performed on the fourth year of the Degree in Veterinary Medicine, specifically throughout the seventh and eighth semesters and it includes the Production, Clinic and Health of the Ruminants.

To develop correctly, it is necessary to have completed previous and basic subjects such as: Embryology and Anatomy I and II, Ethnology and Animal Welfare, Economics and Business, Epidemiology and Biostatistics, Cytology and Histology, Agronomy, Animal Physiology, Genetics, Microbiology and Immunology, Animal Nutrition, Parasitology, Legal Veterinary Deontology and Bioethics, General Pathological Anatomy, Reproduction and Obstetrics, General and Propedeutic Pathology I and II, General Surgical Pathology, Surgery and Anesthesiology, Diagnostic Imaging, Toxicology, Pharmacology and Pharmacotherapy.

With all these bases and the subject itself, students acquire the basic competences on production, clinical and health of ruminants, so necessary for the professional performance and for a better use of the Practicum of Ruminants and the Post-mortem Diagnosis that will have to develop in the fifth year of the Veterinary Degree.

## 1.3. Recommendations to take this course

In order to take this course, it is particularly necessary that the student either has completed all the subjects of the previous courses or is enrolled in those failed ones.

To carry out the practical activities, it is necessary to follow some safety recommendations that must be taken into account. Students have all the information available in the following links, as well as in the ADD courses for each of the subjects:

<https://veterinaria.unizar.es/estudiantes/formacion-prevencion-riesgos-y-seguridad#normas>

<https://veterinaria.unizar.es/prevencion/protocolosespecificosveterinaria>

<http://patologiaanimal.unizar.es/medidas-de-seguridad>

## 2. Learning goals

### 2.1. Competences

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

- Discern and evaluate the most important diseases in the different species of livestock ruminants; knowing the etiology, epidemiology, pathophysiology, clinical signs, lesions of each process, in such a way that manages measures of treatment, prevention or control to minimize risks at the livestock level
- Critically analyze the factors that intervene in the different ruminant production systems, including technical-economic management and sustainability, genetic improvement, rationing and formulation of food rations, the use of pastures and fodder, as well as the quality of the products obtained.
- Make decisions that allow reaching the objectives that may arise in the production systems of ruminants.
- Analyze the importance and repercussions of ruminant diseases in the field of Public Health

### 2.2. Learning goals

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

1. Know and understand the strengths and weaknesses of the bovine and ovine sectors in Spain, the socio-economic and structural constraints of ruminant production and the marketing of their products, with reference to legislative, geographic, sanitary and environmental frameworks.
2. Know the production systems, the reproductive calendars, the handling of the animals and the management of the feeding in each phase of the productive cycle.
3. Include the characteristics of accommodation and facilities and their impact on the different ruminant's production systems.
4. Understand the factors that influence the quality of products.
5. Know how to apply technical-economic management methods and sustainability analysis in ruminant farms.
6. Know the objectives and selection criteria, as well as the techniques used in the genetic improvement of ruminants, with respect to the different characters and genetic parameters.

7. Develop the ability to make genetic improvement decisions, through the integration of available information sources (phenotypic, molecular).
8. Design rations and formulate the concentrated feed necessary to cover the requirements of ruminants according to the production system and phase of the productive cycle.
9. Know, for each production system, the main types of pastures and forages involved and their use, as well as the environmental services provided by these systems.
10. Know the diseases of ruminants, their etiopathogenesis, epidemiology and clinical.
11. Address the diagnosis of any pathological problem that affects ruminants: choose the most appropriate samples and diagnostic techniques in each case and interpret the results.
12. Establish and apply the most appropriate treatment to each pathology and establish prevention and control measures that prevent the appearance of the most important diseases of ruminants.
13. Know and understand the characteristics and reproductive control of ruminants and the mechanisms involved in delivery, as well as the treatment of problems associated with it.
14. Prepare a medical history and a veterinary report.

### 2.3. Importance of learning goals

The knowledge obtained through the subject 'Integration in Ruminants' is the fundamental basis on which the training of the veterinarian dedicated to the production of ruminants and which ranges from the different production systems to the clinic and the health, being useful and necessary because that this learning is more oriented towards a practical activity.

Likewise, this knowledge is basic for the training of the veterinarian dedicated to Public Health, in order to perform functions related to control programs (control, eradication or prevention), mainly referred to zoonotic diseases, and food quality and safety, in reference to the foods that have their origin in ruminants.

Likewise, this learning is necessary for the official veterinarian when applying legal aspects related to the regularization of livestock facilities, animal movements, sanitary programs, etc.

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

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

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

#### Evaluation of learning outcomes 1 to 13:

1. In each semester, at the end of the school period, there will be a written test (proportional to the different contents), which will consist of short-answer, test-type and/or other objective questions, that will correspond to the theoretical and practical classes. Test-type questions may be multiple-choice or true-false. In all cases, a negative score associated with chance will be applied in the event of an erroneous answer, which will at most be the result of the formula  $1 / n-1$ . There will be no question with a negative score.

The first part written test requires a minimum of 25% score in each of blocks 1-5, 6-7, 8-9 and 13 of the learning results. If the qualification of this partial is comprised between 4.5 and 4.9, in subsequent calls, only those blocks with a grade lower than 5 should be examined.

The theoretical written test will suppose 70% of the grade of the subject, having to have passed each one of the partial tests of each semester. In case of not having passed this test and having passed the practical part, the grade obtained in the works and the practices carried out will be maintained for future calls.

1. Throughout the course two works will be carried out (Learning result 14):
  - A clinical report (the students will present a veterinary report based on the information obtained in practices 8 to 16).
  - An analysis of a livestock farm with its corresponding report.

#### 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 methodology followed in this course is oriented towards the achievement of the learning objectives.

The learning process designed for this subject is based on: lectures, practices, visits to livestock farms and team works that favor the development/acquisition of competences explained in section 2.1.

A wide range of teaching and learning tasks are implemented:

- **Lectures:** 115 hours, including an introduction class and presentation of the subject. Theoretical lessons will be taught in the lecture room, being the students divided into two groups.
- **Practice lessons (I):** 52 hours. These will be given at the Animal Research Service teaching room of the Veterinary Faculty; at the Research Centre of the Aragón Government (CITA); at the regional Slaughter House: Mercazaragoza; at the computer room; at the teaching laboratories of Infectious, Parasitic Diseases and Animal Production and at the necropsies room. Practices are divided into 10 sessions of 1 to 3 hours long, received by groups of 6-8 students and 13 sessions of 1 to 1.5 hours long, received by groups of 12-14 students. A work explanation will be given at the beginning of the lesson. The students will do the practice under the professor's supervision afterwards. The students will have guide notes and specific materials for its understanding and execution.
- **Practice lessons (II)** 8 hours: 2 seminars (the whole group), a cattle prospecting work (groups of 2- 4 students) and a visit to a bovine or ovine livestock farm.

Students are expected to participate actively in the class throughout the both semesters.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials, including a discussion forum.

Further information regarding the course will be provided on the first day of class.

### 4.2. Learning tasks

This is a 14 ECTS course, organized as follows:

AF 1: 115 lectures for 94 topics, described in section 4.3.

The first part of the subject is more focused on production, with different sections oriented to bovine or ovine needs. The second part is oriented to pathology, and organized in sections by the different systems.

AF 2: 60 practice lessons described in section 4.3.

The practice have different modalities: practice with computers, laboratory sessions, in a teaching ship, visits to farms, seminars and practice sessions for the exposition on two reports that students have to develop during the course.

With the development of these activities the student will be able to reinforce the knowledge acquired in the theoretical classes.

### 4.3. Syllabus

#### LECTURE SESSIONS

This program consists of 94 topics to teach in 115 contact hours participatory lecture, distributed in 1-hour sessions.

##### 0. Introduction

1. The beef sector in Spain and Europe: Censuses, territorial distribution, production and demand. Marketing and support policies
2. Reproductive control.
3. Application of reproduction biotechnologies.
4. Reproductive failure.

5. Diseases of the female genital apparatus.
6. Attention to childbirth and obstetric problems. Placental retention
7. Diseases of the genital system of the male.
8. Abortions of infectious etiology in cattle and small ruminants.
9. Abortions of parasitic etiology: toxoplasmosis, neosporosis, trichomonosis

### **Beef cattle**

1. Meat production in extensive systems: Justification. Problems. Reproductive management. Production models: high mountain areas. Grasslands. Plateau areas. Humid areas.
2. Grasslands and forages: main types in bovine and ovine systems. Stocking rates of each type. Grazing systems and their advantages and disadvantages.
3. Meat production in intensive systems: Types of production. Veal, beef, mutton, ox. interest.
4. Beef cattle and beef cows feeding: growing and fattening periods. Feeding during reproduction.
5. Growth promoters and terminators: Types of products. Effects. Consequences in carcass and meat. Interest and problems.
6. Carcass and meat quality: Concept. Carcass performance. Conformation. Composition. Carcass classification. Main parameters of meat quality.
7. Facilities: General Designs (free housing and communal boxes). Complementary facilities. Facilities for fodder
8. Goals and criteria of breeding. Analysis of the traits.
9. Breeding schemes. Genetic evaluation of candidates for selection.

### **Dairy cattle**

1. General characteristics: Milk production systems. Structure. Animal bought. Lactation curves
2. Productive and reproductive management: characteristics. Goals. Postnatal cares. Artificial Lactation. Replacement. Livestock farm control. High-production cattle management.
3. Milk production: factors that influence. Milking: phases, times and hygienic conditions
4. Dairy cattle feeding
5. Housing and Facilities: Characteristics. Types of stabling. Facilities for breast-fed calves. Facilities for distribution of food and water. Milking rooms.
6. Nipple diseases and udder oedema
7. Clinical udder inflammation in cattle
8. Subclinical udder inflammation in cattle
9. Control of udder inflammation in cattle
10. Organization of genetic improvement. Breeder's associations. Goals and criteria of selection.
11. Analysis of the traits. Genetic evaluation of candidates for selection.
12. Biotechnology and genomic selection.

### **Sheep and goat**

1. Management of cattle and sheep farming systems. Technical and economic indicators and farm sustainability.
2. Sheep and goat livestock sector in Spain and Europe: census, distribution, productions and demand. Marketing and support policies.
3. Management systems: intensive and extensive. Types. Differences. Trashumance.
4. Reproductive management: Calendars and systems. Use of hormonal and non-hormonal treatments and ram effect.
5. Lamb management: first cares. Artificial rearing. Weaning. Fattening. Replacement
6. Dairy sheep: Reproductive management. Milking. Drying-off
7. Feeding of growing and fattening lambs
8. Feeding of the meat- and milk-producing ewe
9. Meat and dairy sheep facilities: General Designs. Complementary facilities. Milking rooms.
10. Mammitis of infectious etiology in small ruminants..
11. Control of udder inflammation in small ruminants
12. Goals and criteria of genetic improvement in sheep meat. Analysis of the traits.
13. Breeding schemes in sheep meat. Genetic evaluation of candidates.
14. Breeding schemes in sheep and goat milk. Genetic evaluation of candidates.

15. Environmental benefits of the ruminant systems.

### **Young animal diseases**

46. Hypothermia, starvation, omphalitis, ecthyma, otitis.

47. Polyarthritis, white muscle, enzootic ataxia, abscess disease. Caseous lymphadenitis superficial form.

48. Sheep respiratory complex.

49. Bovine Respiratory Syndrome..

50. Bovine Herpesvirus 1 (IBR-IPB/IPV).

51. Ruminant Pestivirus (BVD-BD).

52. Calf diarrhea syndrome.

53. Diarrheal syndrome of lambs and kids

54. Coccidiosis

55. Criptosporidiosis. Giardiosis

### **Respiratory system pathology**

1. Post mortem diagnosis of the main pathologies that affect the lung in adults
2. Pasterelosis.
3. Oestrosis, vermilion bronchopneumonia.
4. Diseases caused by lentivirus .
5. Ovine pulmonary adenocarcinoma. Pseudotuberculosis .
6. Post-mortem diagnosis of the main pathologies that affect the lung in adults.

### **Digestive system and abdomen Pathologies**

62. Oral, mandibular and esophageal lesionsParatuberculosis.

63. Indigestion: simple, acidosis and alkalosis.

64. RT, vagal indigestion, impaction.

65. Tympanism, peritonitis, ruminal fistula

66. Abomasal diseases and DA resolution

67. Abomasal surgery

68. Paratuberculosis

69. Enterotoxemias

70. Trichostrongylidosis, intestinal cestodosis.

71. Fasciolosis

72. Dicroceliosis. Paranfistomosis.

73. Hydatidosis, bovine cysticercosis, cysticercosis of small ruminants

74. Post-mortem diagnosis of the main pathologies of the digestive system in adults.

### **Diseases with nervous symptoms**

1. Bovine nervous system diseases.
2. Ovine nervous system diseases.
3. Listeriosis. Louping ill.
4. Transmissible spongiform diseases
5. Post mortem diagnosis of the main pathologies of the nervous system.

### **Blood pathology**

80. Babesiosis. Theileriosis..

### **Urinary system pathology**

81. Leptospirosis, bacillary hemoglobinuria.

82. Post mortem diagnosis of the main pathologies of the urinary system.

### **Skin and muscle tissue pathology**

83. Besnoitiosis. Sarcocystiosis .

84. Hypodermosis, cutaneous myiasis, scabies, other ectoparasitosis.

85. Small ruminant smallpox. Bovine nodular dermatosis i

### **Podal diseases**

86. Lameness in small ruminants (Pederio).

87. Lameness in cattle.

### **Clinical training and animal welfare**

88. Bacterial and symptomatic carbuncles.

89. Brucellosis.

90. Blue language.

91. Rift Valley Fever, Peste des petits ruminants.

92. Malignant catarrhal fever, foot-and-mouth disease.

93. Bovine tuberculosis. Contagious bovine pneumonia.

### **PRACTICAL ACTIVITIES: 60 hours**

**Practices type I** (at farms, slaughterhouse, laboratories, computer room and necropsies room) (52 hours)

**Practices type II** (seminars, clinical cases, works and visits to livestock farms) (8 hours)

#### **Practices type I**

Practice 1- Formulations of rations for:

1. Growing beef cattle
2. Dairy cattle
3. Pregnant and lactating ewes and growing lambs

Practice 2- Computer genetic management of information

1. Meat
2. Milk

Practice 3- Genetic management of a herd

Practice 4- Cost calculation and break-even analysis in dairy farms.

Practice 5- Ovine milking management

Practice 6- Carcass and meat quality

1. carcass
2. meat

Practice 7- Technical and economic indicators and sustainability assessment in meat sheep and beef cattle farms.



Practice 8 - Introduction to clinical practice  
Practice 9- Clinical cases and podiatry  
Practice 10- Applied ruminants reproduction  
Practice 11- Clinical cases and diagnosis of respiratory diseases  
Practice 12 - Clinical cases and diagnosis of digestive diseases  
Practice 13 - Mastitis

1. Clinical cases and diagnosis of udder diseases
2. Diagnosis of infectious udder diseases

Practice 14 - Examination and pregnancy diagnosis in ruminants

Practice 15 - Post mortem studies in ruminants

Practice 16 - Laboratory diagnosis of infectious diseases of the reproductive system. Joint clinical sessions: preparation and discussion of a report

Practice 17- Laboratory support for the diagnosis of protozoosis.

Practice 18- Laboratory support for the diagnosis of helminthosis and arthropodosis.

Practice 19 - Joint clinical sessions: preparation and discussion of a report

Practice 20 - Presentation of the livestock research

## **Practices type II**

Practice A; Fieldwork (livestock research)

Practice B; Visit to livestock farm (C1- Sheep and C2-Bovine) or taking part in the activity "trashumance"

Seminar I; Welfare programmes in small ruminants Seminar II; Welfare programmes in cattle

The programme is enhanced by:

- Study for the consolidation of knowledge. Preparation for the exams and requested works.
- Tutorials
- Taking tests and doing presentations.

## **4.4. Course planning and calendar**

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Veterinary Faculty website (<http://veterinaria.unizar.es/gradoveterinaria/>).

This link will be updated at the beginning of each academic year.

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

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28429>