Universidad Zaragoza

Academic Year/course: 2022/23

27136 - Veterinary Biotechnology

Syllabus Information

Academic Year: 2022/23
Subject: 27136 - Veterinary Biotechnology
Faculty / School: 100 - Facultad de Ciencias
Degree: 446 - Degree in Biotechnology
ECTS: 6.0
Year: 4
Semester: Second semester
Subject Type: Optional
Module:

1. General information

1.1. Aims of the course

This is a subject with an eminently applicative orientation and the objectives pursued are the following:

As a general objective:

-That the student applies biotechnology concepts to obtain profitable, quality and safe animal products.

Specific objectives:

-That the student knows the existence of animal welfare markers.

-That the student relates animal welfare with the products that are obtained from them.

-That the student understands the relationship between the genetic background of an animal and the products it can be obtained from it.

-That the student knows that the genetic characteristics of animals can be used as markers for the achievement of products of higher quality.

-That the student is able to relate the early diagnosis of animal diseases with the higher yield and quality of animal products.

-That the student knows the importance of disease prevention in animals and its consequences on animal production and human health.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (https://www.un.org/sustainabledevelopment/es/), so that the acquisition of the learning outcomes of the subject provides training and competence to contribute to some extent to their achievement:

- Goal 4: Quality Education

- Goal 5: Gender equality

- Goal 8: Decent work and economic growth

- Objective 9: Industry, innovation and infrastructure.

1.2. Context and importance of this course in the degree

This is an elective course of 6 ECTS, which is part of the 2nd semester of the fourth year. This course provides students with training in the field of domestic animals with which they have no contact in any other course of the degree. The course is mainly focused on the fields of welfare, genetics, prevention and diagnosis of animal diseases and their relationship with the quality of animal products, as well as the impact of animal diseases on the quality of animal products, as well as the repercussion of all this on human health. Veterinary biotechnology is an economically important sector that is involved in everything that has to do with food of animal origin, its quality and safety.

1.3. Recommendations to take this course

In order to successfully take this course, it is recommended to previously take subjects such as ?Biochemistry?, ?Physiology?, ?Genetics?, ?Immunology?, ?Genetic Engineering?, as well as to have studied or to be studying the subjects ?Animal Biotechnology? and ?Biotechnology Applied to Immunology and Microbiology?.

Likewise, in order to do the practical activities, it is necessary to follow some safety recommendations. Students have all the information available in the following links:

https://ciencias.unizar.es/institucional/normas-de-seguridad-en-los-laboratorios

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

2. Learning goals

2.1. Competences

After finishing the course, the student will be more competent to:

-Understand the basics of animal welfare.

- Understand the basis of immunological stress and diagnostic methods.

- Understand the effects of welfare on the production and quality of animal products.

- Use biotechnological tools to obtain animal products in greater quantity and of higher quality.

-Genetically identify individuals and specific species and to know the repercussions of genetics on the quality of animal products.

-Optimize current diagnostic methods using biotechnology.

-Prevent diseases in animals using vaccines and stimulation of the immune system.

-Know the basis of new therapies based on the use of stem cells for the treatment of animal pathologies

In addition to these specific competences, the student will improve in the following areas:

1) The ability to observe.

2) The ability to solve specific problems related to the subjects studied in this course

3) The ability to perform a critical analysis of information.

4) The synthesis and integration of information.

5) Public presentation of topics.

6) To correctly work in a laboratory using the most appropriate methodologies for the handling of reagents and equipment, the annotated record of activities, safety, and waste disposal.

7) Design, perform and analyze experiments and/or applications by applying the scientific method to solve problems following a biotechnological approach.

2.2. Learning goals

The student, to pass this subject, should demonstrate competence in:

-Understanding the concept of animal welfare in a broad sense.

-Understanding the effect of welfare on the production and quality of animal products.

-Knowing the applications of acute phase protein measurement in the assessment of animal welfare.

-Understanding the possibilities of applying genetic concepts to the improvement of animal production and health.

-Knowing the existence of new therapies based on stem cells currently applied in animal pathologies.

-Understanding the importance of the application of biotechnology to the diagnosis of animal pathologies susceptible to be transmitted to humans as well as the diagnosis of food pathogens.

-Identifying the importance of the prevention of animal diseases through the use of vaccines or stimulation of the immune system.

- Understanding the importance of biomarkers that allow a better control of animal diseases and their repercussion on human health

2.3. Importance of learning goals

Competences acquired in this subject allows the student to use veterinary biotechnology in his future professional activity, if that is the final specialization chosen.

3. Assessment (1st and 2nd call)

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

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

The assimilation and mastery of the specific competences will be verified with a written test consisting of multiple choice/test and short questions. In order to pass the course, it will be necessary to obtain a minimum of 5 points out of 10 in the written test. This result will represent 70% of the final grade.

The remaining 30% of the grade will be obtained by the work done in the training activities 2 and 3 (laboratory practices and seminars).

The option of a global test is also open for those students who consider this type of evaluation more appropriate.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process designed for this course consists of the following formative activities:

Formative Activity 1: Acquisition of basic knowledge of the subject (4 ECTS).

Training Activity 2: Laboratory work training (1 ECTS).

Training Activity 3: Seminars and case resolution (1 ECTS).

4.2. Learning tasks

Learning task 1:

-Lectures (4 ECTS). Acquisition of the basic knowledge of the subject. Presentation of the basic theoretical knowledge of the subject through participatory lectures

-Individualized tutorials.

Training activity 2:

-Practical laboratory classes (1 ECTS) in one of the lines indicated in section 4.3. The students will have to present a written report with the results obtained and a brief discussion of them.

-Visit to a high biological security laboratory to acquire knowledge about the operation and management of this type of facilities.

Training activity 3: (1 ECTS). Within the calendar of presential sessions, the following may be included:

-Seminars given by experts in any of the topics suggested in section 4.3.

-Preparation and presentation by the students of seminars based on original scientific publications.

4.3. Syllabus

LECTURES:

Part I. Biotechnological aspects of animal welfare.

- Animal welfare. General concepts and definitions. Human involvement in animal management.

- Stress and animal welfare. Animal welfare in intensive livestock production systems.

- Assessment of animal welfare. Practical implications in livestock management.

- Transport stress and meat quality. General concepts.

- Animal welfare in farm animals. Specific cases according to species.

- The acute phase response (APR). Its context in the innate immune response. Cells involved. Types of APR and general characteristics.

- Acute phase proteins (APPs) in veterinary medicine. APPs response according to species. Methods of measurement of APPs.

- Applications of the measurement of acute phase proteins in the veterinary clinic. Case studies.

Part II. Genetic biotechnology applied to the improvement of animal production and health.

- Protocols of genetic analysis at molecular level. DNA analysis techniques. Molecular markers

- Genetic identification of individuals. Contribution to genetic improvement through the control of herd books. Verification of paternity and maternity. Traceability systems. Control of animal movements and animal products.

- Genetic identification of species: fraud control by molecular methods.

- Genetic characterization and conservation of native breeds.

- Search and analysis of genes of interest in livestock species: adaptation to environmental conditions, increase in the quantity or quality of animal products, resistance or sensitivity to diseases

- Domestic animals as model animals for human pathologies.

- New therapies in veterinary health. Cell therapy. Stem cells. Application of cell therapy to domestic animals.

- Use of animal cells for the study of animal and human diseases.

Part III Biotechnological aspects of diagnosis and prevention of diseases in animals.

- Biotechnological diagnostic systems for diseases affecting animal health.

- Diagnostic systems for zoonoses and food pathogens.

- Basic characteristics of vaccines in animal health.

- Immunomodulators and their use in the prevention of infectious diseases in animals.
- Strategies for vaccine formulation in animal health. Search for antigens and efficient formulations.

Practical sessions:

- Determination of animal welfare by chemical measurement of acute phase proteins.
- Performance of biotechnological techniques applied to the diagnosis of animal diseases.
- Performance of biotechnological techniques applied to the diagnosis of zoonoses and food pathogens.
- Vaccine manufacturing procedures using biotechnological systems.
- Operation of a high biosafety laboratory.
- Working with mesenchymal stem cells in animal species.

4.4. Course planning and calendar

The period of lectures and practical classes will coincide with the period officially established in the academic calendar of the University of Zaragoza. Please consult: https://ciencias.unizar.es/grado-en-biotecnologia

The places where the sessions will be held, the calendar and the groups for practical classes will be established in coordination with the rest of the subjects at the beginning of the course.

For those students enrolled, the places, times and dates of lectures and practical sessions will be made public through the Digital Teaching Ring (ADD) of the subject.

Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: https://ciencias.unizar.es/grado-en-biotecnologia.

The scheduling of the exams will be adjusted to the days and hours assigned by the center.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27136