

# Postgraduate Certificate Ruminant Reproduction





## Postgraduate Certificate Ruminant Reproduction

- » Modality: online
- » Duration: 12 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/pk/veterinary-medicine/postgraduate-certificate/ruminant-reproduction](http://www.techtute.com/pk/veterinary-medicine/postgraduate-certificate/ruminant-reproduction)

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# 01

# Introduction

The knowledge of all the mechanisms involved in reproduction currently makes it possible to obtain higher production rates and, consequently, greater profitability in cattle production, as well as in small ruminants, regardless of whether they are dairy or beef cattle. Not only is it necessary to know reproductive physiology, but it is also necessary to know how to apply and direct this knowledge to increase reproductive indexes and to increase production. In order to achieve this specific knowledge, TECH offers a high-level educational tool: an intensive but flexible course that will take the student to another level.





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*The approach to neurological and ophthalmic diseases in ruminants, with all the specific developments that field work brings with it, in a course focused on real practice"*

There are several factors that can be used to increase reproductive efficiency, among them are feeding and management, but currently the control and manipulation of reproduction at all stages of the animal's life is the basis for obtaining greater efficiency at a biological and economic level in both bovine species and small ruminants. Likewise, nowadays, the knowledge of new reproductive biotechnologies (seminal preservation, embryo production, embryo transfer, etc.) and their application in cattle breeding has allowed a qualitative leap in ruminant reproduction.

As well as the organization, having a reproduction system implies having a herd free of pathologies. For this purpose, it is vital to know the physiology of the animals in order to determine when the physiological to pathological stage is reached, and therefore to be able to establish a diagnosis as soon as possible and an adequate subsequent treatment.

Keeping the organs involved in the reproductive system (ovaries, genital tract, breast) healthy with correct reproductive management, we will be able to maintain the reproductive indexes of the farm, keeping the production at the required levels.

At the end of the program, the veterinary professionals will have developed specialized knowledge in reproduction: methods of control of both the cycle and parturition, and the most advanced reproductive biotechnologies. They will also be able to identify those pathological processes related to reproduction, applying the appropriate diagnostic techniques that will allow them to establish the optimal treatment.

This **Postgraduate Certificate in Ruminants Reproduction** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ◆ The latest technology in Online teaching software
- ◆ A highly visual teaching system, supported by graphic and schematic contents that are easy to assimilate and understand
- ◆ Practical cases presented by practising experts
- ◆ State-of-the-art interactive video systems
- ◆ Teaching supported by telepractice
- ◆ Continuous updating and recycling systems
- ◆ Autonomous learning: full compatibility with other occupations
- ◆ Practical exercises for self-evaluation and learning verification
- ◆ Support groups and educational synergies: questions to the expert, debate and knowledge forums
- ◆ Communication with the teacher and individual reflection work
- ◆ Content that is accessible from any fixed or portable device with an Internet connection
- ◆ Supplementary documentation databases are permanently available, even after the program



*Essential yet rare specialization for the specialist veterinary clinician that will set you apart as a specialist in this field of work"*

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*The clinical, specialized and advanced fundamentals, based on veterinary evidence, that will allow you to face the daily intervention in cattle and ruminants”*

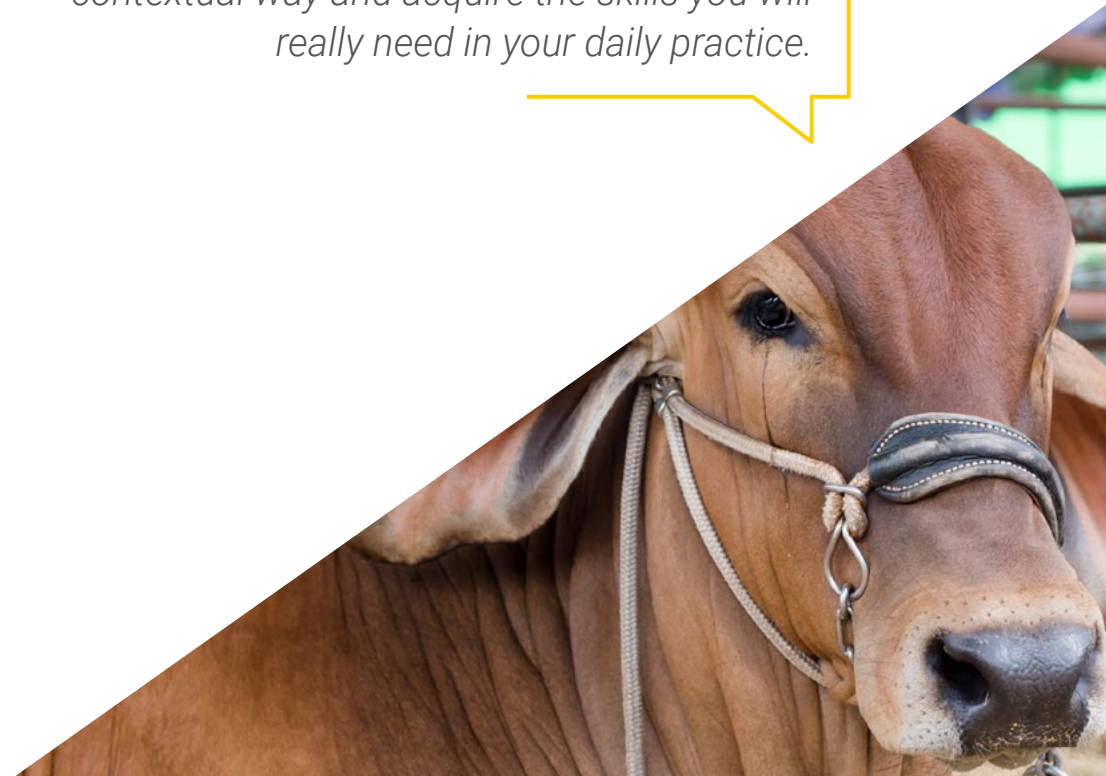
Our teaching staff is made up of professionals from different fields related to this specialty. In this way, TECH makes sure to offer professionals the up-to-date objective it intends. A multidisciplinary team of trained and experienced professionals in different environments who will develop the theoretical knowledge efficiently, but above all, will provide students with the practical knowledge derived from their teaching experience: one of the differential qualities of this program.

This mastery of the subject matter is complemented by the effectiveness of the methodological design. Developed by a multidisciplinary team of e-learning experts, it integrates the latest advances in educational technology. In this way, the student will be able to study with comfortable and versatile multimedia tools that will give them the operability they need in their specialization.

The design of this program is based on Problem-Based Learning: an approach that conceives learning as a highly practical process. To achieve this remotely telepractice will be used: with the help of an innovative system of interactive videos and Learning from an Expert you will be able to acquire the knowledge as if you were facing the case you are learning at that moment. A concept that will make it possible to integrate learning in a more realistic and permanent way.

*With a methodological design based on proven teaching techniques, this innovative program will take you through different teaching approaches to allow you to learn in a dynamic and effective way.*

*Supported by evidence, the approach of this program will allow you to learn in a contextual way and acquire the skills you will really need in your daily practice.*



# 02 Objectives

The completion of this Postgraduate Certificate provides the veterinary professional with specialized and advanced clinical fundamentals, based on evidence to face the daily clinical practice in cattle and ruminants.

In addition to this up-to-date approach to the problems encountered in daily clinical practice, the bibliography provided, and the structuring of the topics will allow you to keep this knowledge up to date.







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*The Postgraduate Certificate in Ruminant Reproduction will allow the veterinary clinician to update and broaden their knowledge and skills in Ruminant Medicine and Surgery”*



## General Objectives

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- ♦ Determine the methods of physical and chemical containment for the development of the clinical activity
- ♦ Examine the different methods of diagnostics and research within the herd
- ♦ Specify the existing treatments useful for the treatment of ruminant pathologies
- ♦ Analyze the importance of analgesia in ruminants, the basis of animal welfare and the management of diseases that usually cause pain in ruminants
- ♦ Establish the economic and health impact of pain in animals and its repercussion on production
- ♦ Generate specialized knowledge on identification and treatment procedures specific to ruminants, in order to reduce, treat or avoid pain in our veterinary management
- ♦ Develop the main analgesic techniques and procedures applied in ruminants
- ♦ Analyze the physiological functioning of all those parts or organic systems of ruminants that, directly or indirectly, participate in the reproductive function both in the female and in the male, as well as the disorders related to them
- ♦ Determine the biotechnology techniques applicable in the field of animal reproduction to improve, productively and/or economically, the reproductive performance of ruminants
- ♦ Examine the reproductive phenomena that are necessary for the achievement of gestation and their diagnosis
- ♦ Develop the reproductive phenomena that occur before, during and after childbirth, as well as those situations of obstetric applicability
- ♦ Generate specialized knowledge on gestation in cattle from its beginning
- ♦ Establish the most important phases and events from a practical point of view
- ♦ Determine the critical points of gestation and their detection
- ♦ Analyze the techniques for pregnancy diagnosis in cattle by palpation, ultrasound and other techniques
- ♦ Determine fetal viability and embryo sexing
- ♦ Analyze the different methods of diagnosis and treatment of the different pathological conditions directly related to the reproductive function in ruminants
- ♦ Examine the mechanics of eutypoid delivery in cows
- ♦ Address the causes of dystocia, and determine the techniques and methods of resolving dystocia in cattle



## Specific Objectives

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- ◆ Compile the methods of containment in bovine animals
- ◆ Determine the basic material for a ruminant clinical veterinarian
- ◆ Identify problems at the collective level
- ◆ Establish the basis of diagnosis and know the special diagnostics in ruminant medicine
- ◆ Specify antimicrobial therapies by means of laboratory studies
- ◆ Analyze fluid therapy as a daily work tool
- ◆ Demonstrate the different analgesic therapies in ruminants
- ◆ Propose different analgesia and sedation protocols at systemic and local level
- ◆ Review particular analgesia and sedation protocols in ruminants
- ◆ Diagnose the main pathologies that cause pain and the techniques or drugs necessary for their treatment
- ◆ Enable the student to establish the pharmacological therapeutic treatments or specific techniques in exploratory and/or surgical procedures necessary for each pathology
- ◆ Determine the characteristics and pathologies of the estrous cycle in ruminants
- ◆ Establish cycle control techniques in optimize production based on reproduction
- ◆ Identify the possible alterations that the reproductive system may suffer in both males and females, in order to diagnose and treat them
- ◆ Recognize the most frequent abortions in ruminants and the main causes that can lead to them
- ◆ Develop the best method of labor management once the different stages of labor have been identified
- ◆ Examine the phases involved in the physiological puerperium of ruminants
- ◆ Address the pathologies that can be established in a pathological puerperium
- ◆ Examine the physiology of lactation and diagnose the main pathologies of the mammary gland
- ◆ Determine the reproductive biotechnologies to be applied according to the type of livestock farm
- ◆ Perform gestational diagnosis, diagnosis of fetal pathology and embryo sexing gestation
- ◆ Determine how to diagnose and treat dystocia, resolve uterine torsion, consider and perform cesarean section
- ◆ Generate specialized knowledge on how to plan and perform a fetotomy



*A training that will boost your work in prevention, management and cost reduction in animal production, providing you with greater competitiveness in the labor market"*

03

# Course Management

For our course to be of the highest quality, we are proud to work with a teaching staff of the highest level, chosen for their proven track record. Professionals from different areas and fields of expertise that make up a complete, multidisciplinary team. A unique opportunity to learn from the best.





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*An impressive teaching staff, made up of professionals of the highest level will be the professors throughout the program providing the most real, close and current learning experience"*

## Management



### Dr. Ezquerra Calvo, Luis Javier

- PhD in Veterinary Medicine from the University of Extremadura
- Degree in Veterinary from the University of Zaragoza
- Specialist in Applied and Experimental Animal Surgery University of Zaragoza
- Specialist in Animal Reproduction and Artificial Insemination University of Zaragoza
- Diploma of the European College of Veterinary Surgeons in Large Animals
- Presents 6 five-year teacher evaluation periods

## Professors

### Dr. Gil Huerta, Lydia

- PhD in Veterinary Medicine Sciences, University of Zaragoza
- Degree in Veterinary Medicine
- Higher Diploma in Animal Production
- Master of Science (CIHEAM)
- Director of the Department of Animal Pathology (Veterinary Faculty) since 2015 to the present
- Principal investigator of 38 Transfer and Research projects and five Infrastructure projects.
- Developer of R&D&I Spin-Off Companies
- Publications: National (37); International (58)
- Participation in national and international conferences (220)
- She has three nationally recognized six-year research periods and one six-year transfer period (CNEAI)
- Director of 16 doctoral theses
- Member of the University Staff Board and of the Veterinary Faculty Board
- Member of the Health and Safety Committee of the University and the Faculty of Veterinary Medicine of Zaragoza



**Dr. Galapero Arroyo, Javier**

- ◆ External advisor to national companies in the Agro-Livestock sector
- ◆ Doctor and Degree in Veterinary Medicine from the University of Extremadura
- ◆ Degree in Veterinary Medicine from the University of Extremadura
- ◆ Master's Degree in extensive livestock farming management
- ◆ Teacher in different graduate and postgraduate courses, university specialization programs and master's degrees
- ◆ Development of doctoral theses and final projects in the Veterinary Degree and as external expert evaluator and member of the tribunal of different doctoral theses
- ◆ Reviewer of scientific articles in three journals indexed in the Journal Citation Report (JCR).

**Ms. Martínez Asensio, Felisa**

- ◆ Degree in Veterinary Medicine from the University of Zaragoza in 1987 PhD at the same university
- ◆ Specialist in Artificial Insemination of Livestock by the General Council of Veterinary Associations of Spain, the Faculty of Veterinary Medicine and the General Council of Aragón
- ◆ Specialist in Animal Reproduction from the Mediterranean Agronomic Institute of Zaragoza
- ◆ Associate Professor at the University of Zaragoza (Spain) in the subject of Reproduction and Obstetrics, and in the Master's Degree of Initiation to Research in Veterinary Sciences, in the Department of Animal Pathology
- ◆ She completes her training in the programs of the Education Sciences Institute of Zaragoza in the field of teaching innovation
- ◆ Tutor of 4th and 5th year students of the Veterinary Degree in the subject "Supervised External Practices of the Veterinary Degree"
- ◆ Tutor of 1st year students in the Orientation Program of the University of Zaragoza
- ◆ She actively participates as a tutor of final degree projects in the Veterinary Degree and as a member of the tribunal of different Doctoral Theses and final degree and Master's Degree projects

#### **Dr. Luño Lázaro, Victoria**

- ♦ PhD in Animal Medicine and Health, Excellent Cum-Laude University of Zaragoza
- ♦ Degree in Veterinary Medicine and Animal Health, University of Zaragoza
- ♦ Master's Degree in Mammalian Reproductive Biology and Technology, University of Murcia, Spain
- ♦ University Expert in Statistics Applied to Health Sciences UNED
- ♦ Associate Professor since 2016 and Assistant Professor Doctor since 2019 at the Faculty of Veterinary Medicine of Zaragoza (Spain) in the subjects of Reproduction and Obstetrics, Swine Integration, Equine Integration, Poultry and Rabbit Integration and Reproductive Biotechnologies in different animal species. She teaches in different graduate and postgraduate courses
- ♦ Faculty of Veterinary Medicine of the University of Zaragoza and the University of Murcia, and in the Official Master's Degree in Swine Health and Production and Official Master's Degree in Biology and Technology of Mammalian Reproduction
- ♦ Her professional career has been focused on the study of new techniques and protocols to improve the quality of cryopreserved semen in different species

#### **Dr. Gil Molino, María**

- ♦ Responsible for the Diagnostic Service and performing clinical diagnostic tasks in different areas, mainly in Infectious Pathology, Parasitology and Pathological Anatomy and in Medical Pathology and Toxicology
- ♦ Degree in Veterinary Medicine from the University of Extremadura.
- ♦ Completion of the Degree Work
- ♦ Diploma of Advanced Doctoral Studies
- ♦ Samples Reception and Veterinary Diagnostic Area at the Clinical Veterinary Hospital

#### **Ms. Zurita, Sofía Gabriela**

- ♦ Degree in Veterinary Medicine from the Catholic University of Salta, Argentina
- ♦ Master's Degree in Companion Animal Medicine and Surgery (Small Animals and Equids); Specialty in Equids. Faculty of Veterinary Medicine, University of Extremadura
- ♦ Currently a PhD student at the University of Extremadura
- ♦ From 2018 to the present Veterinarian in the Reception and Diagnostic Service of biological samples of the Veterinary Clinical Hospital of the University of Extremadura
- ♦ Scientific activity, developed in Argentina and currently in Spain, participating in publications on meat quality and infectious diseases
- ♦ Courses and internships in Argentina at the Animal Health Laboratory - INTA EEA Cerrillos-Salta, Meat Quality Laboratories INTA Balcarcee Institute of Food Technology Castelar, as well as in Spain at the University of Extremadura
- ♦ Internal Large Animal Veterinary Medicine, Internship in Companion Animal Medicine and Surgery (Small Animals and Equids); Specialty in Equids. HCV – UEx
- ♦ Veterinary Clinics in Emergency Services for small and large animals in the city of Salta, Argentina
- ♦ Organizer of the 3rd NOA Student Veterinary Conference, Salta - Argentina

#### **Dr. Blanco Murcia, Francisco Javier**

- ♦ Head of Service of the Clinical Service of Ruminants and Other Species of Abasto of the Clinical Veterinary Hospital (UCM)
- ♦ Director and owner of Large Animal Clinic Los Molinos
- ♦ PhD in Veterinary from the Complutense University of Madrid
- ♦ Degree in Veterinary Medicine from the Complutense University of Madrid
- ♦ Veterinary Diploma in Lidia Bull Studies
- ♦ Diploma of Clinical Anesthesiology in Companion Animals UCM
- ♦ Specialist intern in Bovine Medicine and Surgery at the UCM Clinical Hospital. Category: director



- ♦ Diploma in Bovine Podiatry at Conafe. Category: Director
- ♦ Consultant veterinarian, Association of Sanitary Defense of the Sierra de Guadarrama and collaborating agent authorized as Certifying agent, recognized by the Community of Madrid in different years
- ♦ Founding member of ANEMBE, and First Treasurer of the association
- ♦ Two six-year research periods

#### **Dr. González Orti, Noelia**

- ♦ PhD from the University of Zaragoza
- ♦ Degree in Veterinary from the University of Zaragoza
- ♦ Associate Professor, teaching the subjects of Reproduction and Obstetrics and Integration of Ruminants
- ♦ Specialist in Animal Reproduction (1999, CIHEAM: Mediterranean Agronomic Institute of Zaragoza)
- ♦ Associate Professor in 2005 and 2007 at the University of Zaragoza (Spain) in the subject of Reproduction and Obstetrics and in the Master's Degree of Initiation to Research in Sciences
- ♦ Veterinarian at the Department of Animal Pathology
- ♦ In 2006 she obtained the Pedagogical Training Diploma. Since then, she has continued to complete her training in the programs of the Institute of Educational Sciences of Zaragoza in the field of teaching innovation
- ♦ Associate Professor in 2005 and 2007 at the University of Zaragoza (Spain) in the course of Reproduction and Obstetrics and in the Master's Degree of Initiation to Research in Veterinary Sciences, in the Department of Animal Pathology
- ♦ In 2006 she obtained the Pedagogical Training Diploma. Since then, she has continued to complete her training in the programs of the Institute of Educational Sciences of Zaragoza in the field of teaching innovation
- ♦ Her professional career is focused on the improvement of gamete and embryo preservation methods in different animal species



*The leading professionals in the field have come together to offer you the most comprehensive knowledge in this field, so that you can develop with total guarantees of success"*

04

# Structure and Content

The contents have been developed by the different experts of this Postgraduate Certificate, with a clear purpose: to ensure that students acquire each and every one of the skills necessary to become true experts in this field.

A complete and well-structured program that will take you to the highest standards of quality and success.





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*A teaching program, structured in well-developed teaching units, oriented toward learning that is compatible with your personal and professional life”*

## Module 1. Clinical Skills

- 1.1. Handling and Restraint of Cattle
  - 1.1.1. Introduction
  - 1.1.2. Physical Immobilization Methods
    - 1.1.2.1. Head
    - 1.1.2.2. Limbs
    - 1.1.2.3. Immobilization Devices
  - 1.1.3. Animal Takedown
    - 1.1.3.1. Takedown Systems
    - 1.1.3.2. Handling in Decubitus Position
- 1.2. Veterinary Equipment in Field Clinics
  - 1.2.1. Introduction
  - 1.2.2. Examination Material
  - 1.2.3. Surgical Material
  - 1.2.4. Obstetrical Material
    - 1.2.4.1. Childbirth
    - 1.2.4.2. Insemination
    - 1.2.4.3. Breeder Assessment
  - 1.2.5. Sample Extraction Material
  - 1.2.6. Drug Administration Material
  - 1.2.7. Fluid Therapy Material
  - 1.2.8. Medication
    - 1.2.8.1. Antibiotic Therapy
    - 1.2.8.2. Anti-Inflammatories
    - 1.2.8.3. Hormonal
    - 1.2.8.4. Metabolic and Vitamin
    - 1.2.8.5. Anti-Parasitics II
- 1.3. Herd Health Research
  - 1.3.1. Introduction
  - 1.3.2. Definition of Health and Disease
  - 1.3.3. Animal Welfare: Indicators and Determinants
    - 1.3.3.1. Stress
    - 1.3.3.2. Management
    - 1.3.3.3. Hygiene
    - 1.3.3.4. Transport
  - 1.3.4. Health
    - 1.3.4.1. Disease Transmission
    - 1.3.4.2. Registration and Controls
    - 1.3.4.3. Individual and Herd Clinical Assessment
    - 1.3.4.4. Complementary Tests
    - 1.3.4.5. Reporting and Monitoring
- 1.4. Diagnosis and Clinical Reasoning
  - 1.4.1. Introduction
  - 1.4.2. Diagnostic Process
    - 1.4.2.1. Clinical Examination
    - 1.4.2.2. Hypothetical-Deductive Reasoning
    - 1.4.2.3. Archive
  - 1.4.3. Reasoning Patterns
    - 1.4.3.1. Pattern Recognition Methods
    - 1.4.3.2. Probability
    - 1.4.3.3. Pathophysiological Reasoning
  - 1.4.4. Clinical Signs and Diagnostic Tests
    - 1.4.4.1. Logical Exclusion of Disease
    - 1.4.4.2. Inductive-Deductive Reasoning
  - 1.4.5. Errors
  - 1.4.6. Clinical Reasoning Exercise
    - 1.4.6.1. Clinical Scenarios
    - 1.4.6.2. Clinical Examination
    - 1.4.6.3. Clinical reasoning

- 1.5. Special Diagnostic Procedures
  - 1.5.1. Introduction
  - 1.5.2. Skin
  - 1.5.3. Cardiovascular
    - 1.5.3.1. Percussion
    - 1.5.3.2. Electrocardiography
    - 1.5.3.3. Ultrasound
    - 1.5.3.4. Radiography
    - 1.5.3.5. Pericardiocentesis
    - 1.5.3.6. Blood Culture
  - 1.5.4. Respiratory System
    - 1.5.4.1. Bronchoalveolar Lavage
    - 1.5.4.2. Parasitological Tests
    - 1.5.4.3. Nasal Swabs
    - 1.5.4.4. Radiography
    - 1.5.4.5. Ultrasound
    - 1.5.4.6. Thoracentesis
    - 1.5.4.7. Biopsy
    - 1.5.4.8. Biomarkers
  - 1.5.5. Abdomen
    - 1.5.5.1. Rectal Examination
    - 1.5.5.2. Rumen Fluid Analysis
    - 1.5.5.3. Abdominocentesis
    - 1.5.5.4. Radiography
    - 1.5.5.5. Hepatic Biopsy
    - 1.5.5.6. Liver Function Test
    - 1.5.5.7. Urinary
  - 1.5.6. Mammary Glands
    - 1.5.6.1. California Mastitis Test
    - 1.5.6.2. Conductivity
    - 1.5.6.3. Collection for Microbiological Analysis
  - 1.5.7. Musculoskeletal System
    - 1.5.7.1. Arthrocentesis
  - 1.5.8. Cerebrospinal Fluid Analysis
- 1.6. Antimicrobial Therapy in Cattle
  - 1.6.1. Introduction
  - 1.6.2. Characteristics of the Different Groups of Antimicrobials
    - 1.6.2.1. Sulfonamides
    - 1.6.2.2. Penicillins
    - 1.6.2.3. Tetracyclines
    - 1.6.2.4. Macrolides
    - 1.6.2.5. Aminoglycosides
    - 1.6.2.6. Cephalosporins
    - 1.6.2.7. Lincosamides
  - 1.6.3. Categorization of Antibiotics According to the Risk of their Use
  - 1.6.4. Selection of an Antimicrobial According to the Process
  - 1.6.5. Bacterial Resistance to Antimicrobials
- 1.7. Fluid Therapy
  - 1.7.1. Introduction
  - 1.7.2. Fluid Therapy in Calves
    - 1.7.2.1. Lactic Acidosis in Calves
  - 1.7.3. Fluid Therapy in Adult Cattle
    - 1.7.3.1. Sodium Balance and Dysnatremia
    - 1.7.3.2. Hypokalemic Syndrome in Cattle
    - 1.7.3.3. Calcium and Magnesium Disorders
    - 1.7.3.4. Treatment of Phosphorus Balances
  - 1.7.4. Fluid Therapy in Small Ruminants
  - 1.7.5. Use of Blood and Blood Products in Ruminants

- 1.8. Analgesia
  - 1.8.1. Assessment of Pain in Cattle
  - 1.8.2. Negative Effects of Pain
    - 1.8.2.1. Chronic Pain
    - 1.8.2.2. Acute Pain
  - 1.8.3. Strategies for the Treatment of Pain
    - 1.8.3.1. Preventive Analgesia
    - 1.8.3.2. Multimodal or Balanced Analgesia. Analgesic Drugs
    - 1.8.3.3. Opioids
      - 1.8.3.3.1. Pure Agonists
      - 1.8.3.3.2. Partial Agonists
    - 1.8.3.4.  $\alpha$ 2-Agonists: Xylazine, Detomidine
    - 1.8.3.5. NSAIDs: Ketoprofen, Carprofen, Meloxicam
    - 1.8.3.6. Local Anesthetic. Lidocaine
    - 1.8.3.7. Dissociative Anesthetics. Ketamine
  - 1.8.4. Local Anesthetics
    - 1.8.4.1. Transduction
    - 1.8.4.2. Peripheral of Conduction Blockages
    - 1.8.4.3. Intravenous Regional Anesthesia
    - 1.8.4.4. Nerve Blocks
    - 1.8.4.5. Epidural Administration of Drugs
    - 1.8.4.6.  $\alpha$ 2-Agonists:
      - 1.8.4.6.1.  $\alpha$ 2-Agonists Mechanism of Action, Adverse Effects, Antagonists
      - 1.8.4.6.2. Routes of Administration. Epidural, IV, IM, SC
  - 1.8.5. Combination with Other Drugs: Local Anesthetics, Opiates, Ketamine
    - 1.8.5.1. NSAIDs
    - 1.8.5.2. Mechanism of Action
    - 1.8.5.3. Types of NSAIDs
    - 1.8.5.4. Central Modulatory Inhibitory Effect
    - 1.8.5.5. Preoperative and Postoperative Application
    - 1.8.5.6. Anesthetics
- 1.9. Sedation and Anesthesia Effect
  - 1.9.1. Introduction
  - 1.9.2. Pharmacological Immobilization
    - 1.9.2.1. Means of Teleapplication
      - 1.9.2.1.1. Directly in a Crate or Sleeve Handle
      - 1.9.2.1.2. By Syringe
      - 1.9.2.1.3. At a Distance, Applying Darts with the Drug
  - 1.9.3. Animal in Decubitus or Standing Animal
    - 1.9.3.1. Tranquilization Methods
    - 1.9.3.2. Animal Standing Combining Sedative and Local Anesthesia Techniques
  - 1.9.4. Pharmacological Immobilization plus Locoregional Anesthesia
    - 1.9.4.1. The  $\alpha$ 2-Receptor Agonist Tranquilizers: Xylazine, Detomidine, Romifidine, Medetomidine
    - 1.9.4.2. Advantages of  $\alpha$ 2-Receptor Agonists
      - 1.9.4.2.1. Volume
      - 1.9.4.2.2. Sedative Effect
      - 1.9.4.2.3. Analgesic
      - 1.9.4.2.4. Mixed
      - 1.9.4.2.5. Antagonizable
    - 1.9.4.3. Disadvantages of  $\alpha$ 2-Receptor Agonists
    - 1.9.4.4. Intraoperative and Postoperative Analgesia
      - 1.9.4.4.1.  $\alpha$ 2, Opiates, Ketamine and Tiletamine.
      - 1.9.4.4.2. Local and Regional Anesthesia
      - 1.9.4.4.3. NSAIDs (Non-Steroidal Anti-Inflammatory Drugs)
- 1.10. Local and Regional Analgesia
  - 1.10.1. Incision Line Infiltration Blockage
  - 1.10.2. Inverted Block
    - 1.10.2.1. Inverted L-Block
    - 1.10.2.2. Paravertebral Block
      - 1.10.2.2.1. Proximal and Distal Paravertebral Anesthesia
      - 1.10.2.2.2. Dorsal and Ventral Branch Blockage

- 1.10.3. Epidural Anesthesia
  - 1.10.3.1. Administration
  - 1.10.3.2. Localization
  - 1.10.3.3. Indications
  - 1.10.3.4. The Doses
  - 1.10.3.5. Duration of Effect
  - 1.10.3.6. Applied Pharmacological Combinations
- 1.10.4. Anesthetics
  - 1.10.4.1. Ketamine
  - 1.10.4.2. Tiletamine
  - 1.10.4.3. Etorphine. Prohibited its Use, Possession and Commercialization
    - 1.10.4.3.1. Withdrawn from the Market in 2005
- 1.10.5. Update on Anesthesia in Cattle and Other Ruminants
  - 1.10.5.1. New Anesthetic Protocol
  - 1.10.5.2. Anesthetic Model
  - 1.10.5.3. Anesthetic Combination. Phencyclidines-Detomidine
    - 1.10.5.3.1. Zolazepam-Tiletamine
    - 1.10.5.3.2. Ketamine
    - 1.10.5.3.3. Detomidine
- 1.10.6. Maintaining the Anesthesia
  - 1.10.6.1. Dosage
  - 1.10.6.2. Antagonization
    - 1.10.6.2.1. Precautions
    - 1.10.6.2.2. Basic Anesthetic Monitoring
- 1.10.7. Anesthetic Depth
  - 1.10.7.1. Cardiovascular System
  - 1.10.7.2. Heart Rate
  - 1.10.7.3. Peripheral Pulse Palpation
  - 1.10.7.4. Capillary Refill Time
  - 1.10.7.5. Respiratory System
  - 1.10.7.6. Respiratory Rate and Pattern
  - 1.10.7.7. Mucosal Color
  - 1.10.7.8. Electronic Monitors: Portable Pulse Oximeter

## Module 2. Reproduction

- 2.1. Reproductive Cycle. Control Methods
  - 2.1.1. Characteristics of the Estrous Cycle in the Cow
    - 2.1.1.1. Hormonal Mechanisms
    - 2.1.1.2. Phases of the Estrous Cycle
  - 2.1.2. Characteristics of the Estrous Cycle in the Sheep and Goat
    - 2.1.2.1. Reproductive Season. Phases of the Estrous Cycle
    - 2.1.2.2. Anestrus
  - 2.1.3. Cow Synchronization Methods
    - 2.1.3.1. Natural Methods
    - 2.1.3.2. Pharmacological Methods
  - 2.1.4. Synchronization Methods in Sheep and Goats
    - 2.1.4.1. Natural Methods
    - 2.1.4.2. Pharmacological Methods
  - 2.1.5. Ovulation Induction Systems
- 2.2. Gestation and its Diagnosis
  - 2.2.1. Gestation in Cattle
    - 2.2.1.1. Fertilization and Implantation
    - 2.2.1.2. Fetal Loss (Early Loss)
    - 2.2.1.3. Embryonic Mortality
    - 2.2.1.4. Abortion
  - 2.2.2. Gestational Pathology
    - 2.2.2.1. Hydramnios
    - 2.2.2.2. Hydroallantois
    - 2.2.2.3. Fetal Mummification
    - 2.2.2.4. Fetal Maceration
    - 2.2.2.5. Fetal Malformations and Altered Offspring Syndromes
    - 2.2.2.6. Uterine Torsion
  - 2.2.3. Gestation Diagnosis
    - 2.2.3.1. Diagnostic Methods
    - 2.2.3.2. Diagnosis by Palpation
    - 2.2.3.3. Ultrasound Diagnosis
    - 2.2.3.4. Embryo Sexing
    - 2.2.3.5. Determination of Fetal Viability

- 2.3. Genital Apparatus Diseases in Females
  - 2.3.1. Anatomical Reminder of the Genital Apparatus of Cows and Sheep
  - 2.3.2. Congenital Disorders
  - 2.3.3. Pathologies of the Reproductive System
    - 2.3.1.1. Ovarian Pathologies
    - 2.3.1.2. Oviduct Pathologies
    - 2.3.1.3. Uterine Pathologies
    - 2.3.1.4. Uterine Cervix Pathologies
    - 2.3.1.5. Pathologies of the Vagina and Vulva
- 2.4. Diseases of the Genital Tract of Bulls and Rams for Breeding Purposes
  - 2.4.1. Anatomical Recap of the Genital Apparatus
  - 2.4.2. Infertility and Impotence
  - 2.4.3. Reproductive System Pathologies
    - 2.4.3.1. Scrotal Pathology
    - 2.4.3.2. Testicular Pathology
    - 2.4.3.3. Epididymal Pathology
    - 2.4.3.4. Accessory Gland Pathology
    - 2.4.3.5. Foreskin Pathology
    - 2.4.3.6. Penile Disorders
- 2.5. Abortion. Causes
  - 2.5.1. Types of Abortions
    - 2.5.1.1. Abortions due to Non-Infectious Causes
    - 2.5.1.2. Abortions due to Infectious Causes
- 2.6. Birth. Control and Detection Methods
  - 2.6.1. Physioendocrinology of Childbirth
  - 2.6.2. Phases of Labor
    - 2.6.2.1. Prodromal Phase
    - 2.6.2.2. Dilatation Phase
    - 2.6.2.3. Expulsion Phase
    - 2.6.2.4. Delivery Phase
  - 2.6.3. Delivery Management
    - 2.6.3.1. Feed Control
    - 2.6.3.2. Maternity Ward
  - 2.6.4. Control of Labor
    - 2.6.4.1. Labor Induction
    - 2.6.4.2. Delivery Time Detection System
- 2.7. Dystocia and its Resolution. Cesarean Section
  - 2.7.1. Labor in Cattle
    - 2.7.1.1. Dystocia Vs. Eutocic Labor
      - 2.7.1.1.1. Dystocia in Cattle Origin and Cause
      - 2.7.1.1.2. Genotypic
    - 2.7.1.2. Phenotypic
    - 2.7.1.3. Dystocia Resolution Techniques
      - 2.7.1.3.1. Presentation and Position: Repositioning and Solution
      - 2.7.1.3.2. Disproportion
      - 2.7.1.3.3. Necessary Material and Medication
      - 2.7.1.3.4. Traction Mode and Material
      - 2.7.1.3.5. Resolution of Uterine Torsion
    - 2.7.1.4. Fetotomy
      - 2.7.1.4.1. Partial
      - 2.7.1.4.2. Complete
    - 2.7.1.5. Cesarean Section in Cattle
      - 2.7.1.5.1. Indications
    - 2.7.1.6. Station or Decubitus Cesarean Section
      - 2.7.1.6.1. Surgical Techniques. Description and Indications
      - 2.7.1.6.2. For Left and Right Lumbar
      - 2.7.1.6.3. For Medial
    - 2.7.1.7. Pre-Post Medication and Postoperative Management
      - 2.7.1.7.1. Analgesia
      - 2.7.1.7.2. Antibiotic Therapy
      - 2.7.1.7.3. Uterine Relaxants
      - 2.7.1.7.4. Specific Anesthetic Protocols



- 2.8. Puerperium. Associated Pathologies in the Mother
  - 2.8.1. Phases of the Puerperium
    - 2.8.1.1. Uterine Involution
    - 2.8.1.2. Endometrial Regeneration
    - 2.8.1.3. Elimination of Bacterial Contamination
    - 2.8.1.4. Resumption of Ovarian Activity
  - 2.8.2. Puerperal Pathology
    - 2.8.2.1. Placenta Retention
    - 2.8.2.2. Postpartum Hemorrhage: Diagnosis and Treatment
    - 2.8.2.3. Postpartum Prolapses: Diagnosis and Treatment of Bladder Prolapse, Rectal Prolapse, Uterine Prolapse
    - 2.8.2.4. Puerperal Metritis
- 2.9. Lactation. Mammary Gland Pathology
  - 2.9.1. Mammary Glands. Structure
  - 2.9.2. Operation
    - 2.9.2.1. Mammogenesis
    - 2.9.2.2. Lactogenesis
    - 2.9.2.3. Galactopoiesis
  - 2.9.3. Mammary Gland Pathology
    - 2.9.3.1. Skin and Nipple Disorders
    - 2.9.3.2. Edema
    - 2.9.3.3. Mammitis
  - 2.9.4. Drying Methods
- 2.10. Reproductive Biotechnologies. Current Applications
  - 2.10.1. Sperm Preservation
    - 2.10.1.1. Refrigeration Techniques. Diluents
    - 2.10.1.2. Seminal Freezing Methodology
    - 2.10.1.3. Vitrification
    - 2.10.1.4. Sperm Lyophilization
  - 2.10.2. Artificial Insemination (AI)
    - 2.10.2.1. AI Methods in Cows
    - 2.10.2.2. AI Methods in Small Ruminants
  - 2.10.3. Sperm Selection. Sexing
  - 2.10.4. Embryo Production
    - 2.10.4.1. Oocyte Retrieval. Ovum Pick Up Technique (OPU)
    - 2.10.4.2. In Vitro Embryo Production
      - 2.10.4.2.1. IVM, IVF and ICSI
      - 2.10.4.2.2. Embryo Sexing
      - 2.10.4.2.3. Embryo Preservation Techniques
      - 2.10.4.2.4. Characteristics of an Embryo Production Laboratory
  - 2.10.5. Embryo Transfer
    - 2.10.5.1. Superovulation Treatments
    - 2.10.5.2. Embryo Collection Technique
    - 2.10.5.4. Assessment of Embryo Quality
    - 2.10.5.5. Embryo Transfer. Recipient Selection and Methodology
  - 2.10.6. Regulatory Legislation



*This program will allow you to advance in your career comfortably"*

# 05 Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





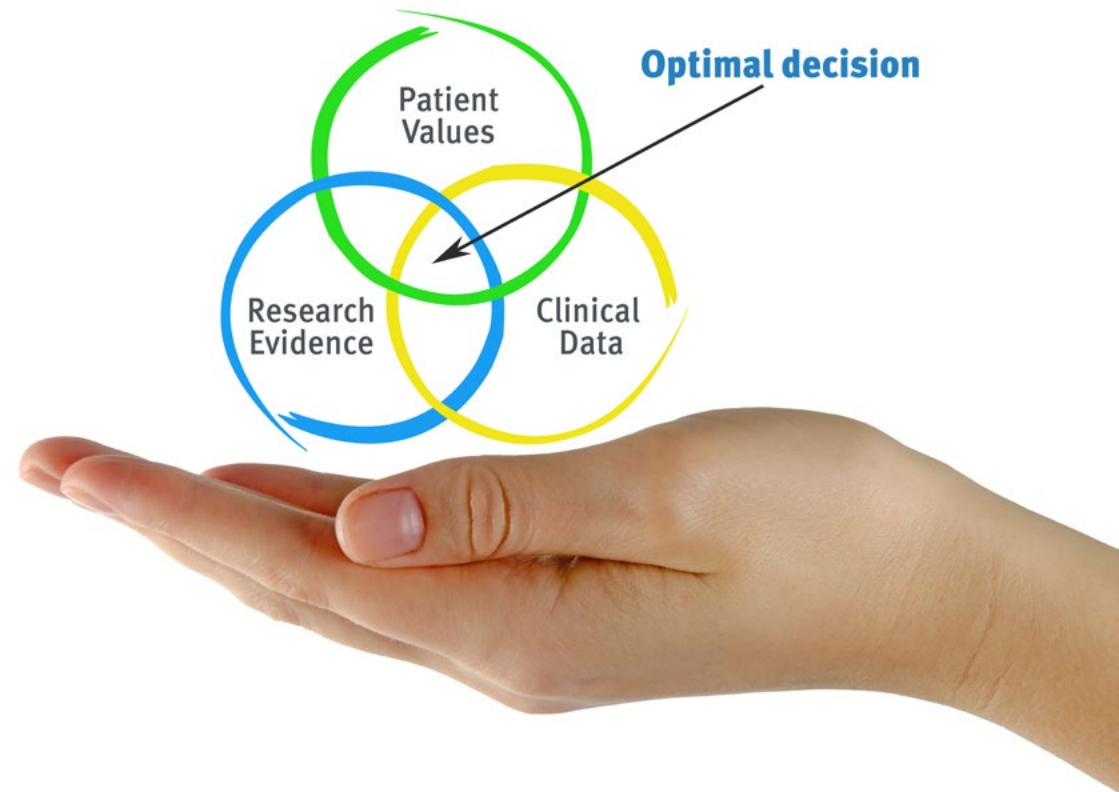
“

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## At TECH we use the Case Method

What should a professional do in a given situation? Throughout the program you will be presented with multiple simulated clinical cases based on real patients, where you will have to investigate, establish hypotheses and, finally, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

*With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.*



According to Dr. Gervas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, in an attempt to recreate the actual conditions in a veterinarian's professional practice.

“

*Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”*

The effectiveness of the method is justified by four fundamental achievements:

1. Veterinarians who follow this method not only manage to assimilate concepts, but also develop their mental capacity through exercises to evaluate real situations and knowledge application
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. The feeling that the effort invested is effective becomes a very important motivation for veterinarians, which translates into a greater interest in learning and an increase in the time dedicated to working on the course.



## Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.



*Veterinarians will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.*

At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology more than 65,000 veterinarians have been trained with unprecedented success in all clinical specialties, regardless of the surgical load. Our teaching method is developed in a highly demanding environment, where the students have a high socio-economic profile and an average age of 43.5 years.

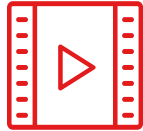
*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.



This program offers the best educational material, prepared with professionals in mind:



#### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



#### Latest Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current and procedures of veterinary techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.



#### Interactive Summaries

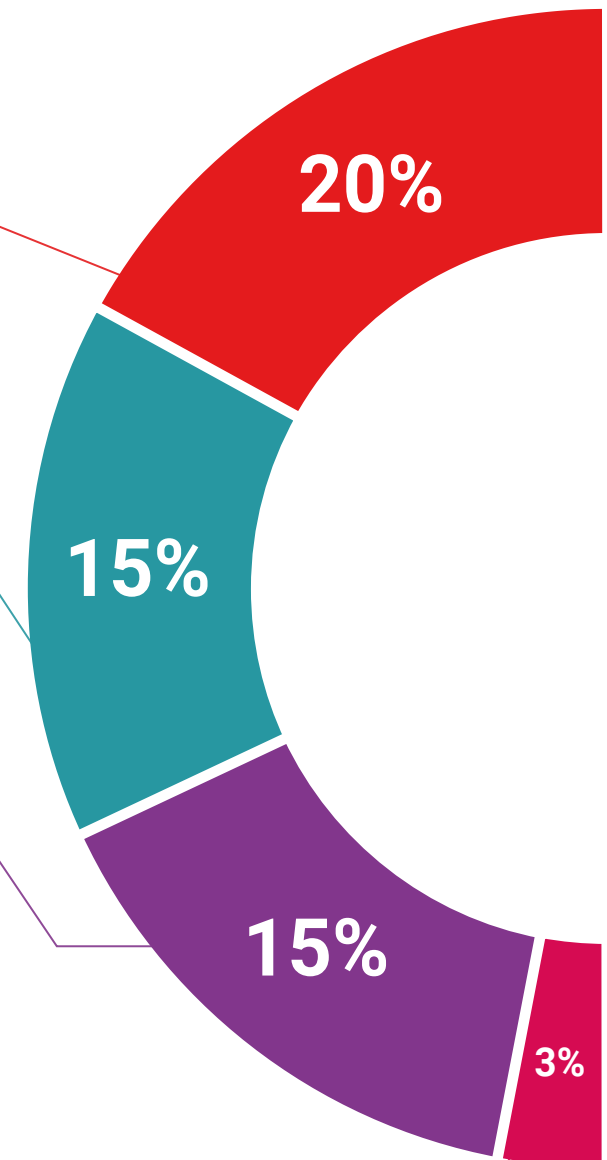
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

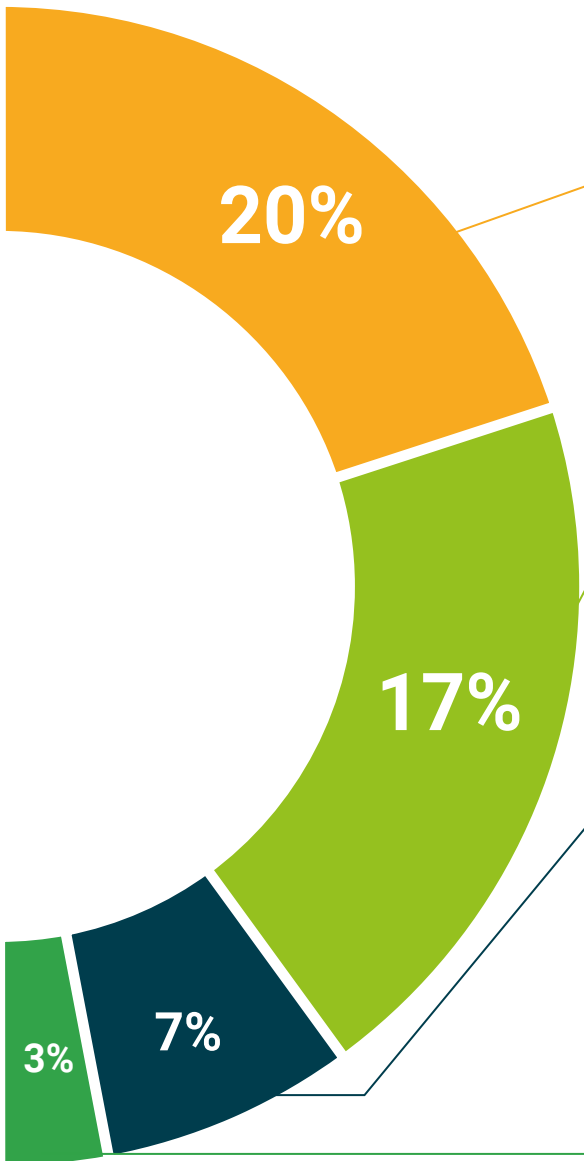


#### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.







#### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



#### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.  
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



#### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.



06

# Certificate

The Postgraduate Certificate in Ruminant Reproduction guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.





*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"*

This **Postgraduate Certificate in Ruminant Reproduction** contains the most complete and up-to-date scientific program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Ruminant Reproduction**

Official N° of Hours: **300 h.**



\*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development language  
classroom



## Postgraduate Certificate Ruminant Reproduction

- » Modality: online
- » Duration: 12 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

# Postgraduate Certificate Ruminant Reproduction