

Master's Degree

Animal Nutrition for Nutritionists





Master's Degree Animal Nutrition for Nutritionists

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: www.techtute.com/us/nutrition/master-degree/master-animal-nutrition-nutritionists

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01

Introduction

This advanced-level specialization is aimed at providing specialized training for nutritionists with expertise in their fields. It focuses on the technical and scientific fields of animal nutrition, through the development of critical and reflective thought in the context of animal production systems.

A complete and comprehensive Master's Degree that will help you to achieve a higher level of skills.



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*A Master's Degree that will enable you to work in
all fields of Animal Nutrition with the competence
of a high-level professional"*

The Master's Degree in Animal Nutrition enables the incorporation, integration and specialization of nutritionists in one of the most important sectors of animal production in the current day. It is a sector with the greatest demand for professionals and the need for specialization.

The current world population is estimated to be 7.6 billion and is expected to increase to 8.6 billion by 2030. Animal nutrition is one of the disciplines being called upon to find ways in which to produce sufficient and economical protein, in an efficient and sustainable manner, to be able to feed this growing demand in the population.

The Master's format allows participants to learn autonomously and optimize their time management.

Study in depth the main raw materials used in the formulation of balanced feed, the characteristics, inclusion levels and quality parameters, since without quality in the basic components of the feed, there is no nutrition.

An entire module is dedicated to the additives used in Ration Manufacturing. This segment is evolving year after year and includes important topics such as antibiotic-free production and the use of phyto-genetic crops, which are currently the most topical issues.

In summary, this Master's Degree is an ambitious, broad, structured and interconnected proposal, which covers everything from the fundamental and relevant principles of nutrition to food manufacturing.

This **Master's Degree in Animal Nutrition for Nutritionists** trains the student to specialize in the food manufacturing process. It also offers you the characteristics of a high-level scientific, teaching, and technological course. These are some of its most notable features:

- ♦ Latest technology in online teaching software.
- ♦ 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.
- ♦ Self-regulating 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 course.



Become a professional in one of the most in-demand fields of the moment: train as a Master in Animal Nutrition for Nutritionists with this comprehensive online master's. "



With a methodological design based on proven teaching techniques, this Master's Degree in Animal Nutrition for Nutritionists will take you through different teaching approaches to allow you to learn in a dynamic and effective"

Our teaching staff is made up of professionals from different fields related to this specialty. In this way, we ensure that we provide you with the training update we are aiming for. A multidisciplinary team of doctors with training and experience in different environments, who will develop the theoretical knowledge in an efficient way, but above all, they will bring their practical knowledge from their own experience to the course: one of the differential qualities of this training.

The efficiency of the methodological design of this Master's Degree, enhances the student's understanding of the subject. Developed by a multidisciplinary team of e-learning experts, it integrates the latest advances in educational technology. In this way, you will be able to study with a range of easy-to-use and versatile multimedia tools that will give you the necessary skills you need for your 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, we will use telepractice learning: with the help of an innovative interactive video system, and learning from an expert, you will be able to acquire the knowledge as if you were actually dealing with the scenario you are learning about. A concept that will allow you to integrate and fix learning in a more realistic and permanent way.

Join the elite, with this highly effective training specialization and open new paths to help you advance in your professional progress.

*Our innovative telepractice concept will give you the opportunity to learn through an immersive experience, which will provide you with a faster integration and a much more realistic view of the contents:
"Learning from an expert."*

02 Objectives

Our objective is to train highly qualified professionals for work experience. An objective that is complemented, moreover, in a global manner, by promoting human development that lays the foundations for a better society. This objective is focused on helping medical professionals reach a much higher level of expertise and control. A goal that you will be able to achieve in just six months thanks to a highly intensive and detailed course.





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If your objective is to broaden your skill set to include new paths of success and development, this is your Master's Degree: a specialization that aspires to excellence"



General Objectives

- ♦ Determine the properties, use and metabolic transformations of nutrients in relation to the nutritional needs of an animal.
- ♦ Provide clear and practical tools so that the professional can identify and classify the different foods that are available in the region and have better elements of judgement to make the most appropriate decision in terms of differential costs, etc.
- ♦ Propose a series of technical arguments which allow for a better quality of diet and nutrition and therefore, improve the end produce (meat or milk).
- ♦ Analyze the different raw material components with both positive and negative effects on Animal Nutrition for Nutritionists and how animals use them for the production of animal protein.
- ♦ Identify and understand the different levels of digestibility for each of the various nutritional components according to their origin.
- ♦ To analyze the key aspects for the design and creation of diets (food) aimed at achieving the maximum utilization of nutrients by animals intended for animal protein production.
- ♦ Provide specialized training on the nutritional requirements for the two main species of birds to be used in animal protein production.
- ♦ Develop specialized understanding of the nutritional requirements of the porcine species and the different feeding strategies needed in order to guarantee that they reach the expected welfare and production standards according to their production stage.
- ♦ Provide practical, theoretical and specialized knowledge on the physiology of canine and feline digestive systems.
- ♦ Analyze the digestive system of ruminants and their particular way of assimilating nutrients from fiber-rich foods.
- ♦ Analyze the main additive groups used in the food production industry, focused on ensuring the quality and performance of different food products.
- ♦ Analyze, in a clear way, how the complete animal feed manufacturing process is developed: the phases and processes which feed undergoes to guarantee its nutritional composition, quality and safety.



A path to achieve specialization and professional growth that will propel you towards a greater level of competitiveness in the employment market"



Specific Objectives

Module I

- ♦ Develop the most relevant concepts of Animal Nutrition and Feeding.
- ♦ Determine how digestive systems are formed and the differences between animal species (monogastrics and ruminants).
- ♦ Analyze the functionality, metabolism and differences between the digestive systems of different species.
- ♦ Establish the different nutritional components of the raw materials used in food production and their function within Animal Nutrition for Nutritionists.
- ♦ Determine how the nutrients are used by different animal species.
- ♦ Compare and contrast the digestive systems of the main species of zootechnical interest.
- ♦ Identify the different nutritional components of the raw materials used in food production and their function within Animal Nutrition for Nutritionists.
- ♦ Examine the analyses used to determine the composition of different foods.
- ♦ Develop the variables and units used to estimate the nutritional intake and requirements.
- ♦ Determine how to measure the energy content of foods and their expressions.

Module II

- ♦ Develop the most important concepts of Animal Nutrition for Nutritionists, taking into account the functions and effects of food in the digestion process in large and small livestock.
- ♦ Classify foods according to their origin and their nutritional characteristics.
- ♦ Design a balanced diet considering the nutritional requirements of the species and categories.
- ♦ Implement the procedures for manufacturing concentrates, guaranteeing the quality of the product to be used for feeding the different productive species.

- ♦ Apply nutrition and feeding strategies for the different productive species according to an annual program based on the herd's requirements.
- ♦ Evaluate the nutritional quality and impact on production systems (meat or milk) of different fresh, preserved and natural feed. These could be either in direct grazing or as forage reserves such as hay (rolls) or whole plant silage, with or without the addition of additives (Nutriliq, Smartfeed, etc.), Multi-Nutritional Blocks (MNB), Rumen Activator Supplements (RAS) or energy or protein concentrates.
- ♦ Develop the main chemical determinations that characterize a feed (concentrates, fresh forages, preserved forages and additives).

Module III

- ♦ Develop the different nutrients contained in the raw materials used in Animal Nutrition for Nutritionists.
- ♦ Develop the different components of each one of the nutrient groups.
- ♦ Determine the destinations or metabolic pathways of nutrients to be utilized by the animal.
- ♦ Establish how animals obtain energy from different nutrients and what energy metabolism consists of.
- ♦ Analyze the different assimilation processes of nutrients that different species of animals have, and which are necessary for their well-being and production.
- ♦ Evaluate the importance of water as a nutrient and the effect that it has on animals.

Module IV

- ♦ Develop the concepts of digestibility and how it is determined.
- ♦ Analyze the advances in protein nutrition and the importance of synthetic amino acids in Animal Nutrition for Nutritionists.
- ♦ Identify the factors which are involved in the definition of the different nutrient levels.
- ♦ Establish the critical points in the use of fats, their quality and effect on nutrition.
- ♦ Develop the basic concepts of organic minerals and their importance.
- ♦ Justify the concept of intestinal integrity and how to enhance it in production.
- ♦ Analyze patterns in the use of antibiotics in Animal Nutrition for Nutritionists.
- ♦ Define the patterns in precision nutrition and the most influential factors in its application.

Module V

- ♦ Establish the nutritional requirements and the feeding programs of broiler chickens.
- ♦ Specify the nutritional requirements of laying hens (commercial eggs).
- ♦ Specify the nutritional requirements and feeding programs in confusion matrices.
- ♦ Identify the critical phases of broilers and layers and the adjustments that can be implemented through the use of special diets.
- ♦ Establish the different nutritional strategies used to manage challenges such as heat stress and shell quality.
- ♦ Analyze the Nutritional Profiles and Strategies that allow a higher yield of meat cuts and modification of egg size.
- ♦ Determine the different production phases in commercial poultry farming by species.
- ♦ Compile the different feeding programs in commercial poultry farming.
- ♦ Apply different strategies in the application of feeding programs focused on guaranteeing zootechnical results.

Module VI

- ♦ Establish the nutritional requirements of fattening pigs.
- ♦ Determine the nutritional requirements of breeding sows.
- ♦ Identify the different stages of production in commercial swine farming.
- ♦ Develop different feeding programs in commercial swine farming.
- ♦ Analyze different strategies in the application of feeding programs focused on guaranteeing zootechnical results.
- ♦ Understand the anatomical and physiological differences in the digestive system of swine which allows them to use alternative raw materials in their diet.
- ♦ Establish the nutritional requirements of slaughter pigs according to their age, production stage and genetic line.
- ♦ Establish the nutritional requirements of sows and breeding boars in each of their life stages and production phases.
- ♦ Design nutritional and feeding programs for swine according to their specific requirements based on age and physiological state.
- ♦ Develop different feeding programs in commercial swine farming.
- ♦ Apply different strategies in the application of feeding programs focused on guaranteeing zootechnical results.

Module VII

- ♦ Identify those myths which are related to the diet of cats and dogs.
- ♦ Establish nutritional requirements for cats and dogs.
- ♦ Analyze the concept of a balanced diet, focusing on the factors that influence their ingestion.
- ♦ Analyze the dietary treatments in certain pathologies whose use is aimed at reducing symptoms and improving the animal's condition.
- ♦ Guarantee an appropriate diet according to the stage of development.
- ♦ Evaluate the types of food available on the pet food market.
- ♦ Establish an appropriate diet based on the physiological state and the development of the species in question.

Module VIII

- ♦ Analyze the digestive system of ruminants and their particular way of assimilating nutrients from fiber-rich foods.
- ♦ Analyze the nutritional metabolism of ruminants, recognising their potential and their limitations.
- ♦ Determine the nutritional requirements for the maintenance and production of the main ruminants of zootechnical interest.
- ♦ Examine the main food resources for ruminants' nutrition, their main characteristics, their advantages and limitations.
- ♦ Evaluate the main feeding strategies for ruminants according to the production context.

Module IX

- ♦ Analyze the different types of additives which exist in the animal feed and nutrition market.
- ♦ Define the recommendations for the use and functionality of the different additive groups.
- ♦ Gain up-to-date knowledge of the new technology focused on improving the quality and efficiency of animal feed.
- ♦ Identify mycotoxins as the hidden enemy in diet quality, animal health and productivity; what are the strategies for their control, the different types and use of mycotoxin binders.
- ♦ Specialize in the use of enzymes in balanced feed, what they are, the differences between enzymes of the same category, what they are used for and the benefits of their incorporation in the diet.
- ♦ Analyze phytogenics as a category that goes beyond essential oils; what they are, types of phytogetic substances, modes of use and benefits.

Module X

- ♦ Determine the processes involved in the creation of feed for animals.
- ♦ Establish an appropriate way to manage raw materials.
- ♦ Analyze the different food presentations and the food manufacturing processes themselves.
- ♦ Identify the different equipment used in the manufacturing of food.
- ♦ Implement monitoring and control programs at critical points in the food manufacturing process.
- ♦ Implement sampling and establish its importance in the quality control process.

03 Skills

This Master's Degree in Animal Nutrition for Nutritionists has been created as a high-skilled training for veterinary professionals. The intensive specialized training will allow you to work in all the fields related to the feeding of production animals, dogs and cats with the confidence of an expert in the field.





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*This program will help you acquire the skills
you need to excel in your daily work"*



General Skills

- ♦ Gain the specific understanding of Animal Nutrition for Nutritionists in the field of veterinary.
- ♦ Describe the nutritional needs of animals by determining the metabolic aspects of each different species.
- ♦ Recognize the other functions of nutrients in the context of animal production and health.
- ♦ Know how to plan an appropriate diet for each species, taking into account availability and opportunity according to the geographical location where it is found.
- ♦ Know the nutritional requirements for poultry for human consumption.
- ♦ Implement appropriate nutritional programs for the swine species, according to the required welfare and production criteria.
- ♦ Recognise the requirements for canine and feline diets and create appropriate nutritional plans.
- ♦ Know the nutritional requirements of ruminants.
- ♦ Know how the animal feed manufacturing process is carried out and which additives are included in it, as well as its suitability.



Specific Skills

Module I

- ♦ Describe the digestive systems of the different animal species, recognising the differences in metabolism.
- ♦ Recognise the nutritive components in raw materials and be able to conduct an analysis of them.

Module II

- ♦ Create a nutritional classification of foods according to their nutritional characteristics in order to propose appropriate diets for different species and situations.
- ♦ Determine how different nutritional approaches affect different animal production species.

Module III

- ♦ Utilize extensive knowledge of all aspects of nutrients to understand the processes of energy and animal protein production.
- ♦ Recognise the importance of water as a nutrient.

Module IV

- ♦ Understand the importance of the concept of digestibility and intestinal integrity and to know which are the factors that influence them.
- ♦ Define the use and characteristics of fats in Animal Nutrition for Nutritionists.
- ♦ Define the use of antibiotics in Animal Nutrition for Nutritionists.

Module V

- ♦ Perform a complete analysis and an appropriate intervention in all aspects of the raising of broiler chickens and laying hens.
- ♦ Carry out nutritional strategies aimed at achieving zootechnical objectives.

**Module VI**

- ♦ Perform a complete analysis and appropriate intervention in all aspects of the raising of breeding and fattening pigs.
- ♦ Carry out nutritional strategies aimed at achieving zootechnical objectives.
- ♦ Know which are the alternative swine feeding strategies.

Module VII

- ♦ Recognise all nutritional aspects of cats and dogs and identify the myths surrounding them.
- ♦ Know how to establish appropriate dietary treatments for every circumstance or pathology.
- ♦ Determine what foods are available in the market and their suitability.

Module VIII

- ♦ Perform a complete analysis and appropriate intervention in all nutritional aspects of ruminants.
- ♦ Carry out nutritional strategies aimed at achieving zootechnical objectives.
- ♦ Know which are the most appropriate strategies for feeding ruminants according to the geographical context.

Module IV

- ♦ Know the nutritional additives in animal feed and be aware of the up-to-date information surrounding this area.

Module X

- ♦ Understand food processing, as well as the proper handling of raw materials by understanding the processes and machinery involved.
- ♦ To know how to perform quality control and, as part of the process, sampling at critical control points of animal feed.

04

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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Leading professionals in the field have come together to teach you about the latest advances in food safety”

Management



D. Cuello Ocampo, Carlos Julio

- ♦ Veterinarian with extensive experience in the areas of Health, Production, Nutrition and Feeding in the line of Poultry, Swine and Cattle Farming.
- ♦ Master's Degree in Ration Formulation for Productive Species
- ♦ Experience in the use and formulation of additives for animal nutrition.
- ♦ Experience in farm management and feed mill development and formulation consulting.
- ♦ Technical Director in Huvepharma NV Laboratories (Bulgaria)

Professors

Dr. Fernández Mayer, Anibal Enrique

- ♦ PhD in Veterinary Science
- ♦ Postdoctorate of Veterinary Science, with a focus on: Animal Nutrition in Institute of Animal Science (IAS)
- ♦ Agricultural Engineer, National University of La Plata (1975-1979), Buenos Aires.

D. Ordoñez Gómez, Ciro Alberto

- ♦ Animal technician
- ♦ Master's in Animal Nutrition for Nutritionists.
- ♦ University Professor in the area of animal nutrition with emphasis on ruminants.

Dr. Páez Bernal, Luis Ernesto

- ♦ PhD in Monogastric Nutrition and Production
- ♦ Doctor Scientiae in Zootechnics, Nutrition and Monogastric Production. Federal University of Viçosa (UFV), MG, Brazil. 2008, MSc in Zootechnics, Nutrition and Monogastric Production. Federal University of Viçosa (UFV), MG, Brazil. 2004
- ♦ Medical nutritionist with a Master's Degree in Monogastric Nutrition and Production
- ♦ Lecturer

Portillo Hoyos, Diana Paola

- ♦ Professional Graduated from the National University of Colombia.

D. Rodríguez Patiño, Leonardo

- ♦ Animal technician Master's in Animal Nutrition for Nutritionists.

Dr. Sarmiento García, Ainhoa

- ♦ Phd in Science and Chemical Technology. (09/ 09.2017 / 2019) University of Salamanca,
- ♦ University Master's in Innovation of Biomedical Sciences and Health. (10- 10.2015 - 2016)
University of León
- ♦ Degree in Veterinary Medicine. (09- 10.2015 - 2014) University of León



An impressive teaching staff, made up of professionals from different areas of expertise, will be your teachers during your training: a unique opportunity not to be missed"

05

Structure and Content

The contents of this Master's Degree have been developed by the different experts on this course, with a clear purpose: to ensure that our students acquire each and every one of the necessary skills 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 comprehensive teaching program, structured in well-developed teaching units, oriented towards learning that is compatible with your personal and professional life"

Module 1. Introduction to Nutrition and Animal Food

- 1.1. Nutrition and Animal Food. Concepts.
 - 1.1.1. Introduction to the Concepts of Nutrition and Food.
 - 1.1.2. Nutrients: Definition and Characteristics.
 - 1.1.3. Importance of Animal Nutrition for Nutritionists.
- 1.2. Digestive Systems and Food Adaptation.
 - 1.2.1. Digestive System and the Digestion Process in Birds.
 - 1.2.2. Digestive System and the Digestion Process in Pigs.
 - 1.2.3. Digestive System and the Digestion Process in Ruminants.
 - 1.2.4. Digestive System and the Digestion Process in Fish (aquatic poikilotherms)
 - 1.2.5. Gastrointestinal Functionality in Animal Nutrition and Health.
- 1.3. Digestive System in Ruminants.
 - 1.3.1. The Rumen as a Source of Nutrients.
 - 1.3.2. Ruminal Physiology.
 - 1.3.3. The Digestion Process in Ruminants.
 - 1.3.4. Volatile Fatty Acids.
 - 1.3.5. Protein of Bacterial Origin.
- 1.4. Measurements of Nutritional Value of Foods and Evaluation Methods.
 - 1.4.1. Characterization of Context.
 - 1.4.2. Physical and Chemical Characterization.
 - 1.4.3. Obtaining Information on the Composition of Nutrients.
 - 1.4.4. Weende Proximate Analysis.
 - 1.4.5. Van Soest Analysis.
 - 1.4.5.1. Analysis using Specialized Analytical Methods.
 - 1.4.5.2. Heat Meter Pump.
 - 1.4.5.3. Amino Acid Analysis.
 - 1.4.5.4. Atomic Absorption Spectrophotometry.
 - 1.4.5.5. Automated Analysis Equipment.
 - 1.4.5.6. Biological and Nutritional Characterization.
- 1.5. Forms of Food Energy.
 - 1.5.1. Forms of Energy Expression.
 - 1.5.2. Gross Energy.
 - 1.5.3. Digestive Energy.
 - 1.5.4. Metabolizable Energy.
 - 1.5.5. Net Energy.
 - 1.5.6. Calculation of Values (EB-ED-EM-EN) according to the NRC and ARC systems.
- 1.6. Energy Content of Food Ingredients
 - 1.6.1. Energy Sources.
 - 1.6.2. Energy and Consumption.
 - 1.6.3. Energetic Balance.
 - 1.6.4. Energetic Density.
- 1.7. Protein and Amino Acid Content of Food Ingredients.
 - 1.7.1. Animal Protein Functions.
 - 1.7.2. Protein Food Resources.
 - 1.7.2.1. Plant Sources - Oilseeds.
 - 1.7.2.2. Plant Sources - Legumes.
 - 1.7.2.3. Animal Sources.
- 1.8. Protein Quality and Digestibility.
 - 1.8.1. Protein Quality.
 - 1.8.1.1. Amino Acid Profile.
 - 1.8.2. Digestibility.
 - 1.8.2.1. Apparent Digestibility.
 - 1.8.2.2. Real Digestibility.
 - 1.8.2.3. Nitrogen Balance.
 - 1.8.2.4. Biological Value.
 - 1.8.2.5. Net Usage of Protein.
 - 1.8.2.6. Protein Efficiency Ratio or Rate.
 - 1.8.2.7. Chemical Score.
 - 1.8.2.8. Protein Digestion.



- 1.9. Other Important Nutrients in Animal Nutrition for Nutritionists.
 - 1.9.1. Minerals and Microminerals.
 - 1.9.1.1. Classification, Functions, General Requirements.
 - 1.9.1.2. Principal minerals: Calcium, Phosphorous, Magnesium, Sodium.
 - 1.9.1.3. Microminerals: Cobalt, Iodine.
 - 1.9.2. Vitamins.
 - 1.9.3. Fiber
 - 1.9.4. Water.
- 1.10. Nomenclature and Classification of Foods (NRC)
 - 1.10.1. Forage or Dry Roughage.
 - 1.10.2. Forage or Fresh Coarse Feed.
 - 1.10.3. Silage.
 - 1.10.4. Concentrated Energy.
 - 1.10.5. Protein Energy.
 - 1.10.6. Mineral Supplement.
 - 1.10.7. Vitamin Supplement.
 - 1.10.8. Non- nutritious Additives.

Module 2. Chemical Composition of Food and Quality of the Raw Materials for Ruminants and Non-Ruminants

- 2.1. Key Concepts of Raw Materials Used in Feeding Ruminants and Non- Ruminants.
 - 2.1.1. Introduction.
 - 2.1.2. Chemical Composition of Food.
 - 2.1.2.1. Water and Dry Material.
 - 2.1.2.2. Organic Material and Minerals.
 - 2.1.2.3. Protein Rich Foods.
 - 2.1.2.4. Energy Rich Foods.
 - 2.1.2.5. Vitamins.
 - 2.1.3. Vitamins.
 - 2.1.3.1. Winter Grains, Summer Grains and Pastures (Grasslands)
 - 2.1.4. Conserved Forages:
 - 2.1.4.1. Silage, Hay and Other Types of Preserved Fodder (Haylage, Silage).
 - 2.1.4.1.1 Silage.
 - 2.1.4.1.2. Hay and Haylage.

- 2.1.5. Energy and Protein Concentrates.
 - 2.1.5.1. Concentrated Energy.
 - 2.1.5.2. Concentrated Protein.
- 2.2. Plant-Based By-products used in Feeding Ruminants and Non-Ruminants.
 - 2.2.1. Cereal Grains.
 - 2.2.1.1. Maize.
 - 2.2.1.1.1. Fine-ground Bran, Bran or Corn Bran.
 - 2.2.1.2. Corn Gluten Feed and Corn Gluten Meal.
 - 2.2.1.2.1. Corn Gluten Feed.
 - 2.2.1.2.2. Corn Gluten Meal.
 - 2.2.2. Sorghum Grain.
 - 2.2.3. Oats, Barley and Wheat Grain.
 - 2.2.3.1. Oat Grain.
 - 2.2.3.2. Barley Grain.
 - 2.2.3.3. Wheat Grain.
 - 2.2.3.3.1. Fine-ground Bran, Bran or Wheat Bran.
 - 2.2.4. By-products of Rice.
 - 2.2.4.1. Fine-ground Bran or Rice Bran.
 - 2.2.5 By-products of Oilseeds.
 - 2.2.5.1. Cotton.
 - 2.2.5.1.1. Cotton Seed.
 - 2.2.5.1.2. Cotton Flour.
 - 2.2.5.2. Soya.
 - 2.2.5.2.1. Soybeans.
 - 2.2.5.2.2. Soybean Shell.
 - 2.2.5.2.3. Soya Flour.
 - 2.2.5.3. Sunflower.
 - 2.2.5.3.1. Sunflower Shell.
 - 2.2.5.3.2. Sunflower Flour.
- 2.6. Horticultural By-products.
 - 2.6.1. Salad Cucumber Crop Residue.
 - 2.6.2. Melon Crop Residue.
 - 2.6.3. Tomato Crop Residue.
- 2.3. Animal-Based By-products used in Feeding Ruminants and Non-Ruminants.
 - 2.3.1. Dairy Industry.
 - 2.3.1.1. Serum Permeate.
 - 2.3.1.2. Cheese Whey and Butter.
 - 2.3.2. Fishing Industry.
 - 2.3.2.1. Fish Flour.
 - 2.3.3. Meat Industry.
 - 2.3.3.1. Recycled Animal Fat.
 - 2.3.4. Poultry Production.
 - 2.3.4.1. Feather Flour.
 - 2.3.1.1. Processes to Improve Digestibility.
 - 2.3.1.2. Supply Methods.
 - 2.3.5. Chicken/ Hen Litter (Chicken Manure)
- 2.4. Fats and Oils used in Feeding Ruminants and Non-Ruminants.
 - 2.4.1. Nutritional Values of Fats in the Feeding of Ruminants and Non-Ruminants.
 - 2.4.1.1. Sources and Types of Fat.
 - 2.4.1.1.1. Yellow Fat.
 - 2.4.1.1.2. Tallow.
 - 2.4.1.1.3. Mixed Fats.
 - 2.4.1.1.4. Soap Extract and Other Sources of Fat.
 - 2.4.1.2. Factors Which Indicate the Digestibility in Ruminants and Non-Ruminants.
 - 2.4.1.2.1. Free Fatty Acids.
 - 2.4.1.2.2. Proportion of Saturated and Unsaturated Fatty Acids.
 - 2.4.1.2.1.1. Addition Method and Level of Inclusion.
 - 2.4.1.2.1.2. Protected Fats.
 - 2.4.1.2.1.3. Calcium Salts of Fatty Acids or Protected Soaps.
 - 2.4.1.2.1.4. Saturated Fats with Variable Degrees of Hydrogenation.
 - 2.4.1.3. Oils used in Feeding Ruminants and Non-Ruminants.
 - 2.4.1.3.1. African Palm Oil.
 - 2.4.1.3.2. Other Vegetable Oils.

- 2.5. Probiotics, Prebiotics, Enzymes and Organic Acids in Feeding Ruminants and Non-Ruminants.
 - 2.5.1. Characterization and Classification of Probiotics and Prebiotics.
 - 2.5.1.1. Prebiotic.
 - 2.5.1.1.1. Basifying Agents or Ruminant Buffers.
 - 2.5.1.1.2. Organic Acids: Malic and Fumaric Acid.
 - 2.5.1.1.3. Plant Extracts: Essential Oils.
 - 2.5.1.1.4. Enzymes.
 - 2.5.1.2. Probiotic.
 - 2.5.1.3. Symbiotics.
 - 2.5.2. Mechanisms of Action and Productive Response.
 - 2.5.2.1. Effects on Young Animals.
 - 2.5.2.2. Effects on Adult Animals.
 - 2.5.3. Brewer's Yeast.
 - 2.5.3.1. Reduction of Unpleasant Odors and Firm Stools.
 - 2.5.3.2. Effects on Growing and Finishing Animals.
 - 2.5.3.3. Effects on Lactating Cows.
 - 2.5.3.4. Effects on Lactating Sheep.
 - 2.5.3.5. Effects on Lactating Goats.
 - 2.6. Liquid Additives, Multinutritional Blocks and Rumen Activator Supplement for Ruminants.
 - 2.6.1. Characteristics of Liquid Energy, Protein and Mineral Additives.
 - 2.6.2. Multinutritional Blocks (MNB) and Rumen Activator Supplement (RAS)
 - 2.6.2.1. Procedure to Create MNB and RAS.
 - 2.6.2.1.1. Proportions of Ingredients and Chemical Composition of MNB and RAS.
 - 2.6.2.1.1.1. Composition of "MNB" or "RAS" with "Smartfeed".
 - 2.6.2.1.1.2. Composition of "MNB" or "RAS" with "Nutraliq 2050" (including Urea).
 - 2.6.2.1.1.3. Composition of "MNB" or "RAS" with Glucose or Molasses
 - 2.6.2.1.1.4. Composition of the Salty Minerals of the MNB and RAS.
 - 2.6.2.2. Purpose of Each Ingredient.
 - 2.6.2.3. Differences Between the MNB and RAS
 - 2.6.2.4. Forms of Supply and Consumption of BMN or SAR.
 - 2.6.2.5. Experimental Work.
- 2.7. Glycerol and Corn and Sorghum Starch for Ruminant and Non-Ruminant Feeds.
 - 2.7.1. Glycerol.
 - 2.7.1.1. Principal Characteristics of Glycerol.
 - 2.7.1.2. Chemical Composition of Glycerol for Animal Consumption.
 - 2.7.1.3. Productive Response.
 - 2.7.1.4. Recommendations.
 - 2.7.2. Corn and Sorghum Starch.
 - 2.7.2.1. Chemical Composition
 - 2.7.2.2. Dry or Wet Starch.
 - 2.7.2.3. Recommendations.
- 2.8. Tannins, Saponins and Essential Oils in Ruminants.
 - 2.8.1. Effect on Ruminant Bacterias.
 - 2.8.2. Effects on Protozoa.
 - 2.8.3. Effects on Rumen Fungi.
 - 2.8.4. Effects on Methanogenic Bacteria.
 - 2.8.5. Effect on Secondary Metabolites of Plants.
 - 2.8.5.1. Effects on the Digestibility.
 - 2.8.5.2. Effects on the Parameters of Ruminant Fermentation.
 - 2.8.5.2.1. Volatile Fatty Acids (AGV)
 - 2.8.5.2.2. Concentration of Ammonia.
 - 2.8.5.2.3. Production of Gas.
 - 2.8.5.2.4. Impacts on Rumen Degeneration and the Digestibility of DM and Cell Wall.
 - 2.8.5.2.5. Impacts on Rumen Degeneration and the Digestibility of Protein.
 - 2.8.5.2.6. Impacts on Digesta Transit Kinetics.
 - 8.5.3 Effects on methanogenesis.
 - 2.8.6. Adaptations to Tannin Consumption.
 - 2.8.7. Positive Effects of Tannins on the Non-Animal Metabolism and Some of the Productive Results.

- 2.9. Mycotoxins and Contaminants in Concentrates and Forage Concentrates in both Ruminants and Non-Ruminants.
 - 2.9.1. Characteristics of Mycotoxins, Typology of Fungi and Favorable Conditions.
 - 2.9.2. Clinical Diagnosis of Mycotoxins, Symptomatology and Associated Diseases Affecting Ruminants and Non-Ruminants.
 - 2.9.2.1. Ruminants.
 - 2.9.2.1.1. Sensitivity.
 - 2.9.2.1.2. Some Symptomatology.
 - 2.9.2.1.3. Symptomatology Associated with Illnesses.
 - 2.9.2.1.4. Mycotoxins and Mycotoxicosis in Poultry and Swine. Symptomatology and Associated Illnesses.
 - 2.9.2.1.4.1. Aflatoxins.
 - 2.9.2.1.4.2. Ochratoxins.
 - 2.9.2.1.4.3. T-2 y DAS.
 - 2.9.2.1.4.4. Fumonisin.
 - 2.9.2.1.4.5. DON (vomitoxina)
 - 2.9.2.2. Non-Ruminants.
 - 2.9.2.2.1. Mycotoxins and Mycotoxicosis in Poultry and Swine. Symptomatology and Associated Illnesses.
 - 2.9.2.2.1.1. Aflatoxins.
 - 2.9.2.2.1.2. Ochratoxins.
 - 2.9.2.2.1.3. Trichothecenes.
 - 2.9.2.2.1.4. Zearalenone.
 - 2.9.2.2.1.5. Fumonisin
 - 2.9.2.2.2. Use of Mycotoxin-Absorbing Substances in Ruminant and Non-Ruminant Feeds.
 - 2.9.3. Factors for the Development of Fungi and their Mycotoxins.
 - 2.9.3.1. In the Countryside.
 - 2.9.3.2. During Storage of the Concentrates.





2.10. Analysis and Quality Control of the Ingredients used in Ruminants and Non-Ruminants.

2.10.1. Chemical Determinations.

2.10.1.1. Dry Matter (DM)

2.10.1.2. Organic Material (OM) and Minerals.

2.10.1.3. Digestibility of Dry Matter.

2.10.1.3. Direct Methods.

2.10.1.3.1. "In Vivo" Methods.

2.10.1.4. Indirect Methods.

2.10.1.4.1. "Different" Method.

2.10.1.4.2. Internal Markers.

2.10.1.4.3. Lignin

2.10.1.4.4. Silica.

2.10.1.4.5. Insoluble Organic Material in Acids.

2.10.1.5. External Markers.

2.10.1.5.1. Dyed Food.

2.10.1.5.2. Chromic Oxide.

2.10.1.5.3. Rare Earth Elements.

2.10.1.5.4. Mordant Chrome-Treated Fiber.

2.10.1.5.5. Hydrosoluble Markers.

2.10.1.5.6. Alkanes.

2.10.1.6. "In Vitro" Methods.

2.10.1.6.1. "In Vitro" Digestibility of Dry Matter (DM).

2.10.1.6.2. Neutral Detergent Fiber (NDF)

2.10.1.6.3. "In Vitro" Digestibility of Neutral Detergent Fiber (NDF).

2.10.1.6.4. Acidic Detergent Fiber (ADF)

2.10.1.7. Protein.

2.10.1.7.1. Crude Protein (Total Nitrogen, CP)

2.10.1.7.2. Soluble Crude Protein (SCP)

2.10.1.7.3. Neutral Detergent Fiber-Bound Nitrogen (ADIN)

2.10.1.8. Ethereal Extract (EE)

2.10.1.9. Water Soluble Carbohydrates (WSC)

2.10.1.10. Lignin, cellulose, hemicellulose and silica (LIG, CEL, HEM, SIL)

2.10.1.11. Taninos.

2.10.1.12. PH in Silage Samples.

2.10.1.13. Particle Sizes.

- 2.10.2. Summary of Some Laboratory Techniques.
 - 2.10.2.1. Total Nitrogen (semi-micro kjeldahl)
 - 2.10.2.2. "In Vitro" Digestibility (Tilley Terry Edited. Direct Acidification Method)
 - 2.10.2.3. Neutral Detergent Fiber (NDF) (with ANKOM equipment)
 - 2.10.2.4. Acidic Detergent Fiber (ADF) (with ANKOM equipment)
 - 2.10.2.5. Soluble Non-Structural Carbohydrates (NSC) Antrona method, developed by A.J. Silva (Viscosa-Brasil)
 - 2.10.2.6. Total Starch (Megazyme enzyme kit - AA/AMG) (AACC Method 76-12)

Module 3. Nutrients and Metabolism

- 3.1. Carbohydrates.
 - 3.1.1. Carbohydrates in Animal Food.
 - 3.1.2. Classification of Carbohydrates.
 - 3.1.3. Digestion Process.
 - 3.1.4. Fiber and Digestion of Fiber.
 - 3.1.5. Factors which Affect the Utilisation of Fiber.
 - 3.1.6. Physical Function of Fibre.
- 3.2. Metabolism of Carbohydrates.
 - 3.2.1. Metabolic Fate of Carbohydrates.
 - 3.2.2. Glycolysis, Glycogenolysis, Glycogenesis and Gluconeogenesis.
 - 3.2.3. Pentose Phosphate Cycle.
 - 3.2.4. Krebs Cycle.
- 3.3. Lipids.
 - 3.3.1. Classification of Lipids.
 - 3.3.2. Functions of Lipids.
 - 3.3.3. Fatty Acids.
 - 3.3.4. Digestion and Absorption of Fats.
 - 3.3.5. Factors which Affect Lipid Digestion.
- 3.4. Functions of Lipids.
 - 3.4.1. Metabolic Fate of Lipids.
 - 3.4.2. Fat Metabolism Energy.
 - 3.4.3. Oxidative Rancidity.
 - 3.4.4. Essential Fatty Acids.
 - 3.4.5. Lipid Metabolism Problems.
- 3.5. Energetic Metabolism.
 - 3.5.1. Measurement of Heat Reaction.
 - 3.5.2. Biological Partitioning of Energy.
 - 3.5.3. Nutrient Caloric Increase.
 - 3.5.4. Energy Balance.
 - 3.5.5. Environmental Factors that Influence Energy Requirements.
 - 3.5.6. Characteristics of Energy Deficiencies and Excesses.
- 3.6. Protein.
 - 3.6.1. Protein Classification.
 - 3.6.2. Functions of the Different Proteins.
 - 3.6.3. Digestion and Absorption of Proteins.
 - 3.6.4. Factors which Affect Protein Digestion.
 - 3.6.5. Nutritional Classification of Amino Acids for Poultry and Swine.
- 3.7. Protein Metabolism in Poultry and Swine.
 - 3.7.1. Metabolic Fate of Proteins.
 - 3.7.2. Gluconeogenesis and Degradation of Amino Acids.
 - 3.7.3. Excretion of Nitrogen and Synthesis of Uric Acid.
 - 3.7.4. Imbalance of Amino Acids and Energetic Cost of Protein Metabolism.
 - 3.7.5. Interaction Between Amino Acids.
- 3.8. Vitamins and Minerals.
 - 3.8.1. Vitamin Classification.
 - 3.8.2. Vitamin Requirements for Poultry and Swine.
 - 3.8.3. Vitamin Deficiencies.
 - 3.8.4. Macro and Micro minerals.
 - 3.8.5. Interaction Between Minerals.
 - 3.8.6. Organic Chelates.
- 3.9. Mineral and Vitamin Metabolism.
 - 3.9.1. Vitamin Interdependence.
 - 3.9.2. Deficiencies and Toxicity of Vitamins.
 - 3.9.3. Choline.
 - 3.9.4. Metabolism of Calcium and Phosphorus.
 - 3.9.5. Electrolyte Balance.

- 3.10. Water. The Forgotten Nutrient.
 - 3.10.1. Principal Functions of Water.
 - 3.10.2. Distribution of Water in an Organism.
 - 3.10.3. Sources of Water.
 - 3.10.4. Factors Affecting Water Requirements.
 - 3.10.5. Water Requirements.
 - 3.10.6. Requirements for the Quality of Drinking Water.

Module 4. Digestibility, Ideal Protein and Advances in Animal Nutrition for Nutritionists

- 4.1. Apparent Digestibility Coefficients.
 - 4.1.1. Techniques to Obtain the Ileal Digesta.
 - 4.1.2. Methodology to Calculate Digestibility.
- 4.2. Endogenous Losses.
 - 4.2.1. Origin and Composition of Endogenous Amino Acids.
 - 4.2.2. Techniques to Measure Endogenous Losses.
- 4.3. Standardized Coefficients and True Digestibility.
- 4.4. Factors Affecting Digestibility Coefficients.
 - 4.4.1. Age and Physical State.
 - 4.4.2. Food Consumption and Composition.
- 4.5. Synthetic Amino Acids in Animal Nutrition for Nutritionists.
 - 4.5.1. Synthesis of Synthetic Amino Acids.
 - 4.5.2. Use of Synthetic Amino Acids in Diets.
- 4.6. Ideal Protein and Advances in Protein Nutrition.
 - 4.6.1. Concept of Ideal Protein.
 - 4.6.2. Profiles of Ideal Protein.
 - 4.6.3. Use of Practical Applications.
- 4.7. Estimation of Nutritional Requirements Through Performance Experiments.
 - 4.7.1. Evaluation Methods for Nutritional Requirements.
 - 4.7.2. Determining Requirements.
- 4.8. Factors Affecting Nutrient Utilization.
 - 4.8.1. Age.
 - 4.8.2. Physical State.
 - 4.8.3. Level of Consumption.
 - 4.8.4. Environmental Conditions.
 - 4.8.5. Diet.
- 4.9. Importance of the Quality and Stability of Fats in Nutrition.
 - 4.9.1. Types of Fats.
 - 4.9.2. Nutritional Profile of Fats.
 - 4.9.3. Quality.
 - 4.9.4. Inclusion of Fat in the Diet.
- 4.10. Organic Minerals in Monogastric Nutrition.
 - 4.10.1. Macrominerals.
 - 4.10.2. Microminerals.
 - 4.10.3. Structure of Organic Minerals.
- 4.11. The Importance of Integrity and Intestinal Health in Animal Nutrition for Nutritionists.
 - 4.11.1. Intestinal Physiology and Anatomy.
 - 4.11.2. Intestinal Health and Digestibility.
 - 4.11.3. Factors which Affect Intestinal Integrity.
- 4.12. Strategies for Animal Production Without Using Growth Enhancing Antibiotics.
 - 4.12.1. Effects of Antibiotics on Nutrition.
 - 4.12.2. Risk of Using Antibiotics.
 - 4.12.3. Global Patterns.
 - 4.12.4. Formulation and Feeding Strategies.
- 4.13. Concept of Precision Nutrition.
 - 4.13.1. Diets Close Up.
 - 4.13.2. Animal Models.
 - 4.13.3. Ideal Protein.
 - 4.13.4. Physiological State.
 - 4.13.5. Growth Physiology.

Module 5. Nutrition and Food in Poultry

- 5.1. Broiler Chickens, Feeding Programs and Nutritional Requirements.
 - 5.1.1. Genetic Evolution and Changes in Nutritional Requirements.
 - 5.1.2. Food Programs.
 - 5.1.3. Nutritional Requirements in the Main Genetic Lines.
 - 5.1.4. Nutrition by Gender.
 - 5.1.5. Nutritional Strategies to Reduce Environmental Impact.
- 5.2. Special Food for Broiler Chickens.
 - 5.2.1. Transport Feed (from Hatchery to Farm)
 - 5.2.2. Pre-Starter Food.
 - 5.2.3. Finishing Food.
- 5.3. Nutritional Strategies to Improve the Quality of a Whole Chicken.
 - 5.3.1. Production Focus: Whole Chicken or Chicken Pieces.
 - 5.3.2. Feeding Program for Chicken Pieces.
 - 5.3.3. Nutritional Adjustments for Increased Chicken Breast Yield.
 - 5.3.4. Strategies to Ensure the Quality of Fresh or Chilled Whole Chickens.
- 5.4. Pullet Chickens, Feeding Programs and Nutritional Requirements.
 - 5.4.1. Nutritional Program According to Age and Performance.
 - 5.4.2. Nutritional Specifications of Pullet Diets.
 - 5.4.3. Factors Affecting the Performance and Optimization of Nutrient Consumption.
 - 5.4.4. Pre-Posture Diet.
- 5.5. What is the Purpose of a Pre-Posture Diet?
 - 5.5.1. Supply Period.
 - 5.5.2. Nutritional Profile of the Pre-Posture Diet.
 - 5.5.3. Calcium and Phosphorus in Pre-Posture Diet.
- 5.6. Layer Hens, Feeding Programs and Nutritional Requirements.
 - 5.6.1. Posture Stages and Characteristics.
 - 5.6.2. Staged Feeding Program.
 - 5.6.3. Nutritional Requirements.
 - 5.6.4. Consumption Models.
 - 5.6.5. Food Texture.
 - 5.6.6. Egg Size.

- 5.7. Nutrition and Egg Shell.
 - 5.7.1. Importance of the Shell Quality.
 - 5.7.2. Formation of the Shell.
 - 5.7.3. Factors Which Affect a Good Quality Shell.
 - 5.7.4. Nutritional Strategies and the Additives to Safeguard the Quality of the Shell.
 - 5.7.5. Confusion Matrices, Feeding Programs and Nutritional Requirements.
 - 5.7.6. Development Stages of the Breeder.
 - 5.7.7. Feeding Program for Chicks.
 - 5.7.8. Nutritional Requirements of Chicks.
 - 5.7.9. Nutritional Program for Breeding Adults.
 - 5.7.10. Male Nutrition.
 - 5.7.11. Nutrition and Hatchability.
- 5.8. Nutritional Strategies and the Additives for the Intestinal Health of Poultry.
 - 5.8.1. Importance of Intestinal Health and Integrity.
 - 5.8.2. Aspects Which Challenge the Intestinal Integrity.
 - 5.8.3. Nutritional Strategies to Safeguard Intestinal Health.
 - 5.8.4. Additives and Programs for Intestinal Health.
- 5.9. Caloric Stress and Nutritional Strategies.
 - 5.9.1. Physiology and Caloric Stress.
 - 5.9.2. Nutrition and Endogenous Heat Production.
 - 5.9.3. Electrolyte Balance.
 - 5.9.4. Physiological Mechanisms of Heat Dissipation in Birds.
 - 5.9.5. Nutritional Strategies to Help Combat Caloric Stress.

Module 6. Nutrition and Food in Pigs

- 6.1. Productive Phases and Food Programs in Pig Farming.
 - 6.1.1. Gestation and Lactation.
 - 6.1.2. Replacement females.
 - 6.1.3. Piglet Initiation.
 - 6.1.4. Raising of Commercial Pigs.
 - 6.1.5. Fattening and Completion of Commercial Pigs.
- 6.2. Pre-start-up Diets, Nutrition Challenges and Opportunities to Optimize Performance.
 - 6.2.1. Nutritional Requirements for Piglets in Maternity and Rearing.
 - 6.2.2. Digestibility of Nutrients in Piglets' Diets.
 - 6.2.3. Special Raw Materials.

- 6.3. Simple and Complex Diets for Piglet Performance in Pre-Starting Piglets.
 - 6.3.1. Simple Diets.
 - 6.3.2. Expected Performance with the use of Simple Diets in Piglets.
 - 6.3.3. Complex Diets.
 - 6.3.4. Expected Performance with the use of Complex Diets in Piglets.
 - 6.3.5. Intestinal Integrity in Piglets.
- 6.4. Food Programs and Nutritional Needs of Growing Pigs.
 - 6.4.1. Stages of Production in Growing Pigs.
 - 6.4.2. Food for the Different Phases of Growth.
 - 6.4.3. Nutritional Requirements in Growing Pigs.
 - 6.4.4. Nutrition Focused on the Intestinal Integrity of Growing Pigs.
- 6.5. Food Programs and Nutritional Needs of Fattening and Finishing Pigs.
 - 6.5.1. Food for Fattening Pigs.
 - 6.5.2. Nutritional Requirements for Fattening Pigs.
- 6.6. Nutrition and Food in the First-Time Sow.
 - 6.6.1. Understanding the Nutrition of a Replacement Female.
 - 6.6.2. Nutritional Requirements for Replacement Females.
 - 6.6.3. Nutritional Requirements for First-Time Sows.
 - 6.6.4. Gestation in First-Time Sows.
 - 6.6.5. Lactation in First-Time Sows.
- 6.7. Nutrition and Food in the Lactating Sows.
 - 6.7.1. Ad Libitum Feeding in Lactating Females.
 - 6.7.2. Nutritional Requirements for Lactating Females.
 - 6.7.3. Requirements According to the Size of the Litter.
- 6.8. Nutrition and Food in the Pregnant Sows.
 - 6.8.1. Post-weaning Feeding.
 - 6.8.1. Food for Different Phases During Gestation.
 - 6.8.1. Nutritional Requirements for Pregnant Females.
- 6.9. Interactions Between Health, Immune System and Nutrition of Pigs.
 - 6.9.1. The Digestive System as Part of the Pig's Immune System.
 - 6.9.2. Interaction between Nutrition and Immunity.
 - 6.9.3. Nutrition Focused on Improving the Intestinal Health and Integrity.
- 6.10. Alternative Nutrition to Reduce the Environmental Impact of Pig Farming.
 - 6.10.1. Impact of Nutrition of the Environment.
 - 6.10.2. Nutrition Focused on Reducing the Environmental Impact of Pig Slurry.

Module 7. Nutrition and Food in Canines and Felines

- 7.1. Physiology of the Digestive System of Canines and Felines (I)
 - 7.1.1. Introduction.
 - 7.1.1. Functioning of the Digestive System.
 - 7.1.1. Principle Differences and Similarities Between Both Species.
- 7.2. Physiology of the Digestive System of Canines and Felines (II)
 - 7.2.1. Introduction.
 - 7.2.2. Balanced Diet.
 - 7.2.3. Factors that influence ingestion.
- 7.3. Requirements.
 - 7.3.1. Energy and Carbohydrates for Dogs and Cats.
 - 7.3.2. Fats and Proteins.
 - 7.3.3. Vitamins and Minerals.
- 7.4. Foods Available for Pet Animals.
 - 7.4.1. Introduction.
 - 7.4.2. Types of Diets.
 - 7.4.3. Owner's Interpretation of the Label.
- 7.5. Nutrition for Different Stages of Life (I)
 - 7.5.1. Introduction.
 - 7.5.2. Maintenance for Adults.
 - 7.5.3. Food for Puppies.
- 7.6. Nutrition for Different Stages of Life (II)
 - 7.6.1. Reproduction and Lactation.
 - 7.6.2. Food for Pets of an Advanced Age.
 - 7.6.3. A Special Case. Food for Racing Dogs.
- 7.7. Pathologies Derived from Nutrition and their Treatments (I)
 - 7.7.1. Introduction.
 - 7.7.2. The Obese Patient.
 - 7.7.3. The Underweight Patient.
- 7.8. Pathologies Derived from Nutrition and their Treatments (II)
 - 7.8.1. Cardiac Patient.
 - 7.8.2. Renal Patient.
 - 7.8.3. Liver patient.

- 7.9. Pathologies Derived from Nutrition and their Treatments (II)
 - 7.9.1. Gastrointestinal Problems.
 - 7.9.2. Skin Diseases.
 - 7.9.3. Diabetes Mellitus.
- 7.10. Nutritional Management in Extreme Situations.
 - 7.10.1. Introduction.
 - 7.10.2. Food for a Sick Patient.
 - 7.10.3. Intensive Care Nutritional Support.

Module 8. Nutrition and Food in Ruminants

- 8.1. Digestion and Ruminant Process in Bovines.
 - 8.1.1. Anatomy of the Digestive System of a Ruminant.
 - 8.1.2. Physiology and Importance of Rumination.
 - 8.1.3. Ruminant Microorganisms and their Importance.
 - 8.1.4. Digestion of Carbohydrates in Rumen.
 - 8.1.5. Digestion of Fats in Rumen.
 - 8.1.6. Digestion of Nitrogen Compounds in Rumen.
- 8.2. Post-ruminant Digestion and Metabolism.
 - 8.2.1. Post-ruminant Digestion of Carbohydrates, Lipids and Proteins.
 - 8.2.2. Absorption of Nutrients in the Ruminant.
 - 8.2.3. Metabolism of Carbohydrates, Lipids and Proteins in Ruminants.
- 8.3. Protein Requirements.
 - 8.3.1. Methodology for Protein Titration in Ruminants.
 - 8.3.2. Maintenance Requirements.
 - 8.3.3. Gestation Requirements.
 - 8.3.4. Milk Production Requirements.
 - 8.3.5. Growth Requirements.
- 8.4. Energy Requirements.
 - 8.4.1. Methodology of Energetic Valuation in Ruminants.
 - 8.4.2. Maintenance Requirements.
 - 8.4.3. Gestation Requirements.
 - 8.4.4. Milk Production Requirements.
 - 8.4.5. Growth Requirements.

- 8.5. Fiber Requirements.
 - 8.5.1. Fiber Valuation Methods.
 - 8.5.2. Fiber Requirements for Maintaining Good Health and Production in Ruminants.
- 8.6. Mineral and Vitamin Requirements.
 - 8.6.1. Hydrosoluble Vitamins.
 - 8.6.2. Liposoluble Vitamins.
 - 8.6.3. Macrominerals.
 - 8.6.4. Microminerals.
- 8.7. Water, Requirements and Factors which Affect its Consumption.
 - 8.7.1. Importance of Water in the Production of Ruminants.
 - 8.7.2. Water Quality for Ruminants.
 - 8.7.3. Water Requirements for Ruminants.
- 8.8. Nutrition and Food in Lactating Ruminants.
 - 8.8.1. Physiology of Esophageal Leakage.
 - 8.8.2. Requirements in Lactating Ruminants.
 - 8.8.3. Diet Design for Lactating Ruminants.
- 8.9. Main Foods in Diets for Ruminants.
 - 8.9.1. Fibrous Foods.
 - 8.9.2. Energy Rich Foods.
 - 8.9.3. Protein Rich Foods.
 - 8.9.4. Vitamin Supplements.
 - 8.9.5. Mineral Supplements.
 - 8.9.6. Additives and Others.
- 8.10. Dietary Formulation and Supplements for Bovines.
 - 8.10.1. Requirement Calculations.
 - 8.10.2. Ration Balancing Methods.
 - 8.10.3. Dietary Formulation for Beef Cattle.
 - 8.10.4. Dietary Formulation for Dairy Cattle.
 - 8.10.5. Dietary Formulation for Sheep and Goats.

Module 9. Additives in Animal Food

- 9.1. Definitions and Types of Additives Used in Animal Food.
 - 9.1.1. Introduction.
 - 9.1.2. Classification of Additive Substances.
 - 9.1.3. Additives for Quality.
 - 9.1.4. Performance Enhancing Additives.
 - 9.1.5. Nutraceuticals.
- 9.2. Anticoccidials and Growth-Promoting Antibiotics
 - 9.2.1. Types of Anticoccidials.
 - 9.2.2. Anticoccidials Programs.
 - 9.2.3. Growth-Promoting Antibiotics and Purposes of Use.
- 9.3. Enzymes.
 - 9.3.1. Phytases.
 - 9.3.2. Carbohydrases.
 - 9.3.3. Proteases.
 - 9.3.4. Mananasa Beta.
- 9.4. Antifungals and Mycotoxin Binders.
 - 9.4.1. Importance of Fungal Contamination.
 - 9.4.2. Types of Fungi that Contaminate Grains.
 - 9.4.3. Substances with Antifungal Characteristics.
 - 9.4.4. What are Mycotoxins?
 - 9.4.5. Types of Mycotoxins.
 - 9.4.6. Types of Binders.
- 9.5. Acidifiers and Organic Acids.
 - 9.5.1. Objectives and Approaches to the Use of Acidifiers in Poultry and Swine.
 - 9.5.2. Types of Acidifiers.
 - 9.5.3. What are Organic Acids?
 - 9.5.4. Main Organic Acids Used.
 - 9.5.5. Mechanisms of Action.
 - 9.5.6. Technological Characteristics of Acidifiers.
- 9.6. Antioxidants and Pigmenting Agents.
 - 9.6.1. Importance of Antioxidants in Balanced Foods and Animal Nutrition for Nutritionists.
 - 9.6.2. Natural and Synthetic Antioxidants.
 - 9.6.3. How Antioxidants Work.
 - 9.6.4. Pigmentation in Eggs and Chicken.
 - 9.6.5. Pigment Sources.
- 9.7. Probiotics, Prebiotics, and Symbiotics.
 - 9.7.1. Differences between Probiotics, Prebiotics, and Symbiotics.
 - 9.7.2. Types of Probiotics and Prebiotics.
 - 9.7.3. Approaches and Strategies of Use.
 - 9.7.4. Benefits of Poultry and Pig Farming.
- 9.8. Odour-Controlling Products
 - 9.8.1. Air Quality and Ammonia Control in Poultry Farming.
 - 9.8.2. Yucca Shidigera.
 - 9.8.3. Odour Controls in Pig Farming.
- 9.9. Phytochemicals.
 - 9.9.1. What are Phytochemical Substances?
 - 9.9.2. Types of Phytochemical Substances.
 - 9.9.3. Procurement Processes.
 - 9.9.4. Mechanisms of Action.
 - 9.9.5. Essential Oils.
 - 9.9.6. Flavonoids.
 - 9.9.7. Pungent Substances, Saponins, Tannins and Alkaloids.
- 9.10. Bacteriophages and Other New Technologies.
 - 9.10.1. What are Bacteriophages?
 - 9.10.2. Recommendations for Use.
 - 9.10.3. Proteins and Bioactive Peptides.
 - 9.10.4. Egg Immunoglobulins.
 - 9.10.5. Additives for the Correction of Process Losses.

Module 10. Manufacturing of Balanced Foods: Processes, Quality Control and Critical Points

- 10.1. From Formula to Food Processing, Aspects to be Considered.
 - 10.1.1. What is a Balanced Food Formula and What Information Should it Contain?
 - 10.1.2. How to Read and Analyze a Balanced Food Formula.
 - 10.1.3. Preparation of Raw Materials and Additives.
 - 10.1.4. Equipment Preparation.
 - 10.1.5. Basic Analysis of Manufacturing Costs of Balanced Foods:
- 10.2. Storage of Cereals.
 - 10.2.1. Reception Process of Raw Materials.
 - 10.2.2. Sampling of Raw Materials.
 - 10.2.3. Basic Analysis upon Reception.
 - 10.2.4. Types of Storage and Characteristics.
- 10.3. Storage of Liquids and Animal By-products.
 - 10.3.1. Liquid Products and Handling and Storage Characteristics.
 - 10.3.2. Dosage of Liquid Products.
 - 10.3.3. Control Regulations and Storage of Animal By-products.
- 10.4. Steps in the Process for Making Balanced Foods.
 - 10.4.1. Weighing.
 - 10.4.2. Milling.
 - 10.4.3. Mixing.
 - 10.4.4. Addition of Liquids.
 - 10.4.5. Conditioning.
 - 10.4.6. Pelletizing.
 - 10.4.7. Cooling.
 - 10.4.8. Packaging.
 - 10.4.9. Other Processes.
- 10.5. Milling and the Nutritional Consequences.
 - 10.5.1. Purpose of Milling.
 - 10.5.2. Types of Mill.
 - 10.5.3. Efficiency of Milling.
 - 10.5.4. Importance of Particle Size.
 - 10.5.5. Effects of Particle Size on the Zootechnical Performance of Birds and Pigs.



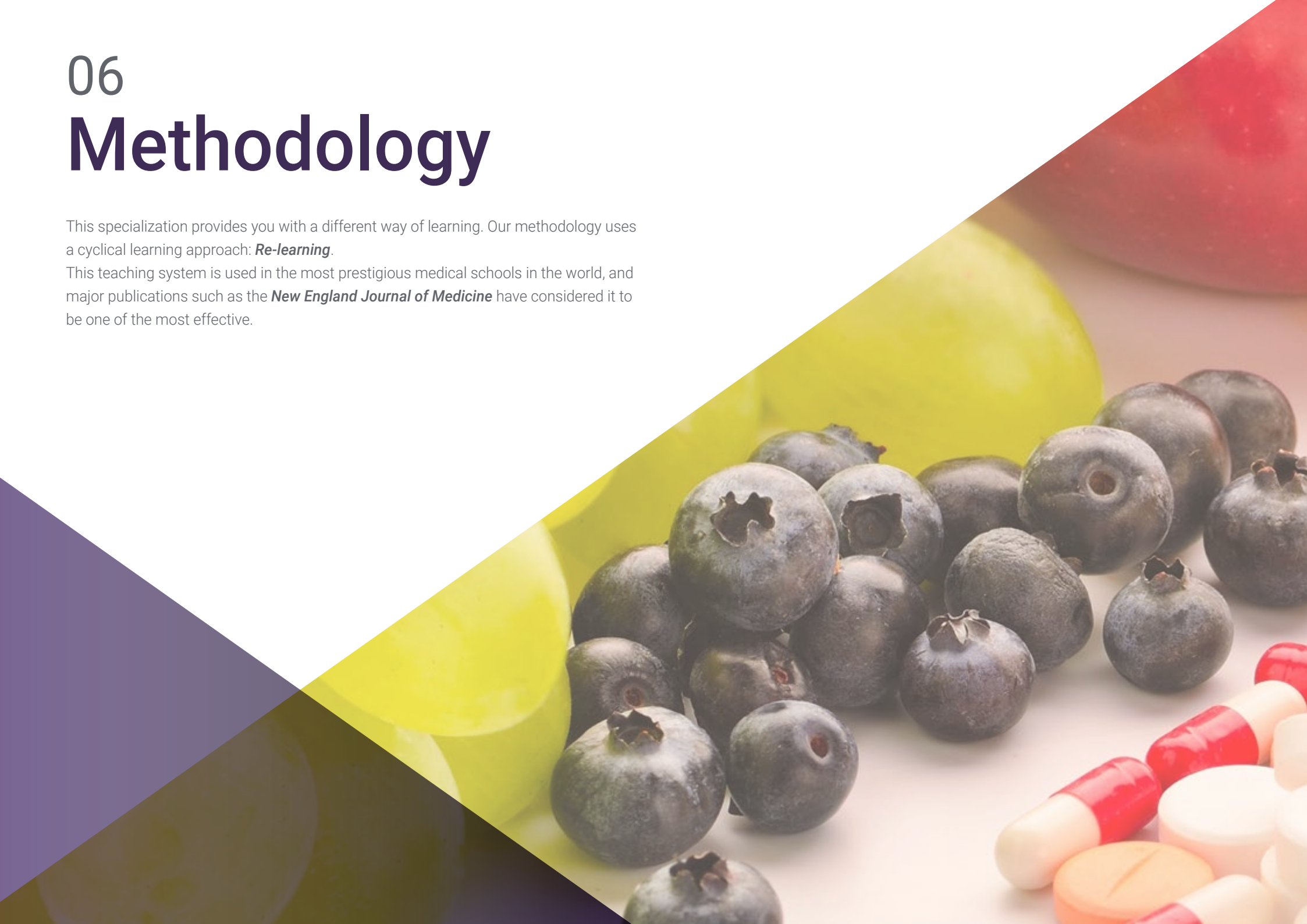


- 10.6. Mixing, Uniformity and the Nutritional Consequences.
 - 10.6.1. Types of Mixers and Characteristics.
 - 10.6.2. Stages in the Process of Mixing.
 - 10.6.3. Importance of the Process of Mixing.
 - 10.6.4. Coefficient Variation of Mixing and Methodology.
 - 10.6.5. Effects of a Bad Mix on the Animal Performance.
- 10.7. Pelletizing, Quality and the Nutritional Consequences.
 - 10.7.1. Purpose of Pelletizing
 - 10.7.2. Phases in the Process of Pelletizing.
 - 10.7.3. Types of Pellets.
 - 10.7.4. Factors which Affect and Benefit the Success of the Process.
 - 10.7.5. Pellet Quality and Effects on the Zootechnical Performance.
- 10.8. Other Machines and Equipment Used in the Balancing Industry.
 - 10.8.1. Sampling Probes.
 - 10.8.2. Quarters.
 - 10.8.3. Moisture Meters.
 - 10.8.4. Sieve.
 - 10.8.5. Densiometric tables.
 - 10.8.6. Hopper Scale.
 - 10.8.7. Mill Batchers.
 - 10.8.8. Post-pellets Applications.
 - 10.8.9. Monitoring Systems.
- 10.9. Forms and Types of Feed Offered by Balanced Feed Plants.
 - 10.9.1. Flour Foods.
 - 10.9.2. Peletized Foods.
 - 10.9.3. Extruded Food.
 - 10.9.4. Wet Food.
- 10.10. Control Quality Control and Critical Points Control.
 - 10.10.1. Quality Administration in the Plant.

06 Methodology

This specialization provides you with a different way of learning. Our methodology uses a cyclical learning approach: ***Re-learning***.

This teaching system is used 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.



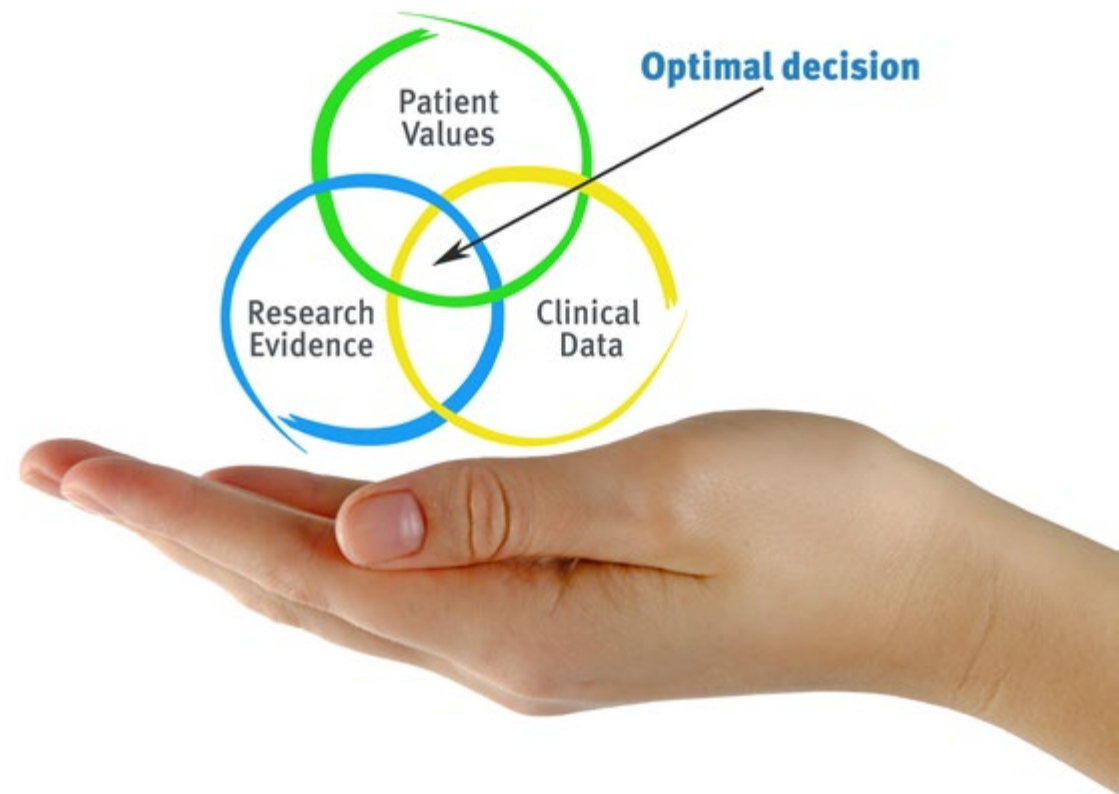
“

Discover Re-learning, 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

In a given clinical situation, what would you do? 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 abundant scientific evidence on the effectiveness of the method. Nutritionists learn better, faster, and more sustainably over time.

With TECH, nutritionists can experience a way of learning that is shaking the foundations of traditional universities around the world.



According to Dr. Gérvas, 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 potential or because of its uniqueness or rarity. It is essential that the case is based on current professional life, trying to recreate the real conditions in professional nutritional practice.

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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. Nutritionists who follow this method not only grasp concepts, but also develop their mental capacity by evaluating real situations and applying their knowledge.
2. The learning is solidly focused on practical skills that allow the nutritionist to better integrate the knowledge into clinical practice.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



Re-learning Methodology

At TECH we enhance the Harvard case method with the best 100% online teaching methodology available: Re-learning.

Our 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, which represent a real revolution with respect to simply studying and analyzing cases.

The nutritionist will learn through real cases and by solving 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 Re-learning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best Spanish-speaking online university (Columbia University).

With this methodology we have have trained more than 45,000 nutritionists with unprecedented success, in all clinical specialties regardless of the workload. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Re-learning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.

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

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



In this program you will have access to the best educational material, prepared with you 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 really specific and precise.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



Nutrition Techniques and Procedures on Video

We introduce you to the latest techniques, to the latest educational advances, to the forefront of current nutritional procedures and techniques. All this, in first person, with the maximum rigor, explained and detailed for your assimilation and understanding. And best of all, you can watch them as many times as you want.



Interactive Summaries

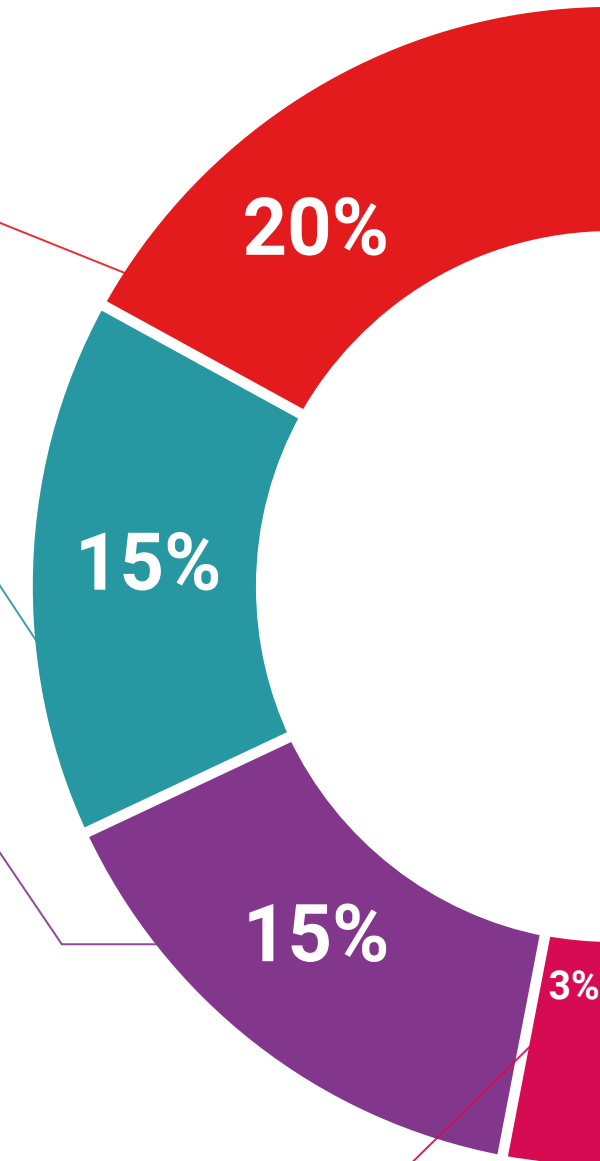
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

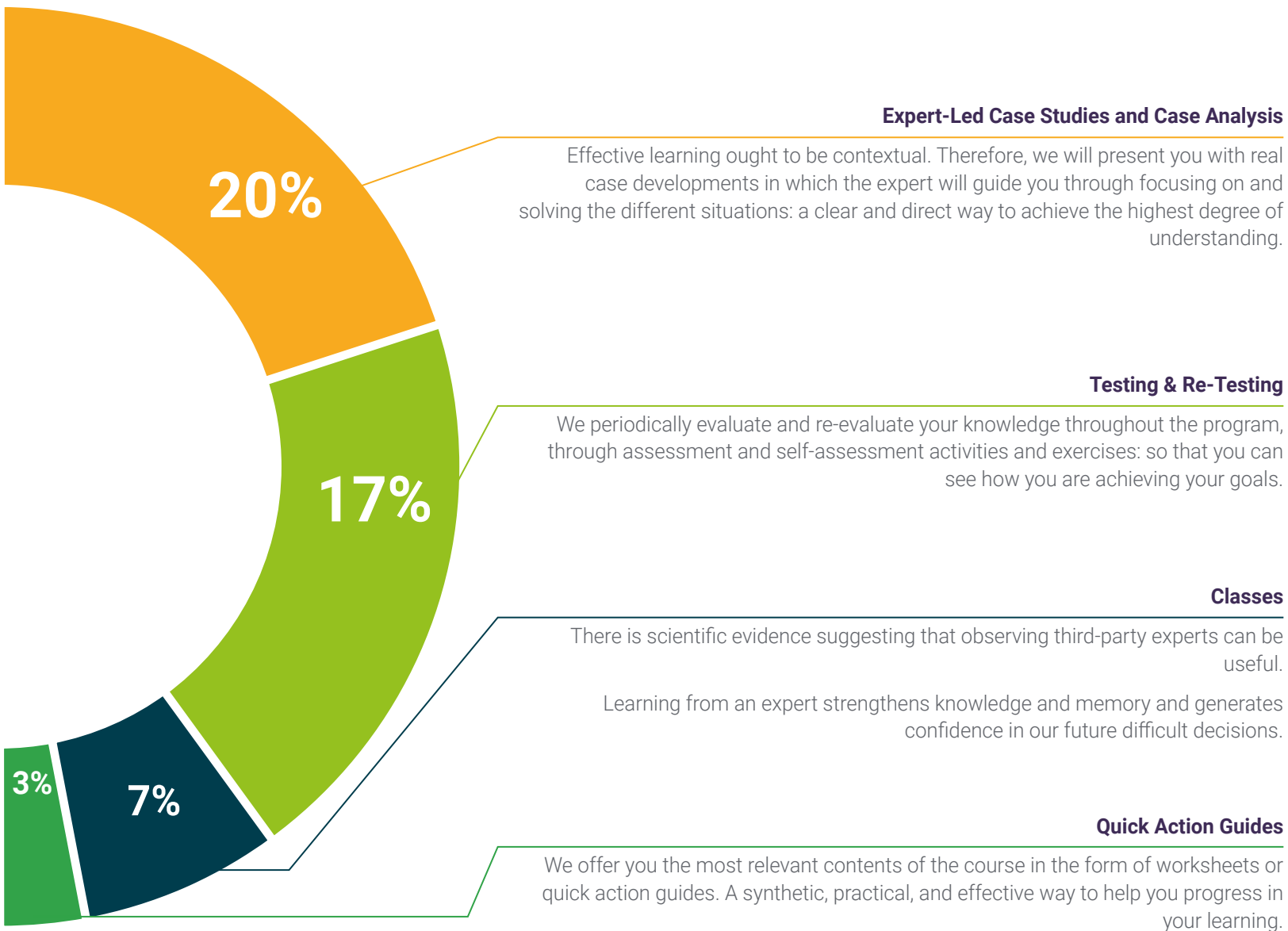
This unique specialization system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



Additional Reading

Recent articles, consensus documents, international guides... in our virtual library you will have access to everything you need to complete your specialization.





07 Certificate

The Master's Degree in Animal Nutrition for Nutritionists guarantees students, in addition to the most rigorous and up-to-date education, access to a Master's Degree issued by TECH Global University.



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Add the Master's Degree in Animal Nutrition for Nutritionists to your CV and become a highly competitive professional"

This program will allow you to obtain your **Master's Degree diploma in Animal Nutrition for Nutritionists** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

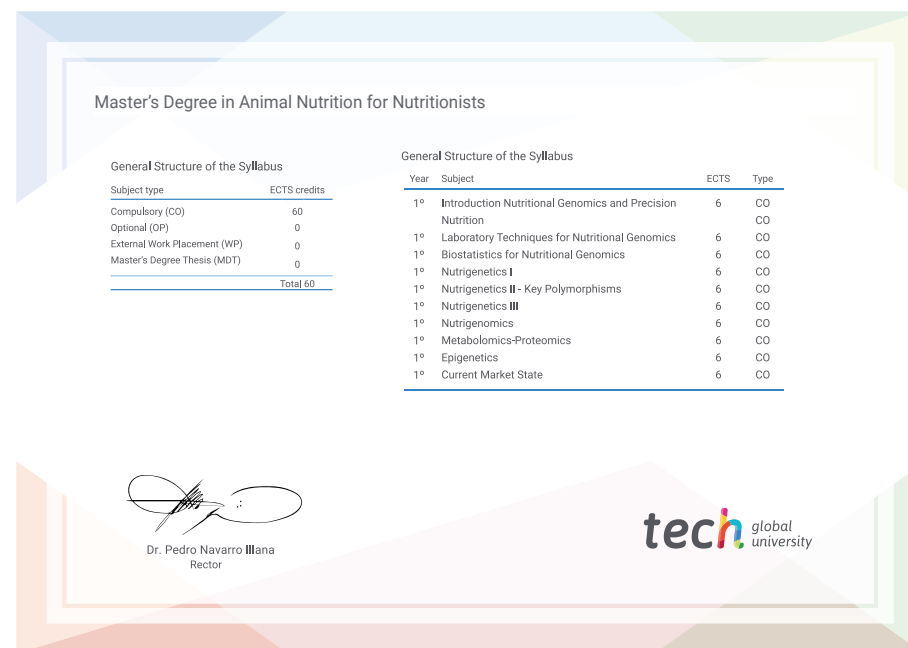
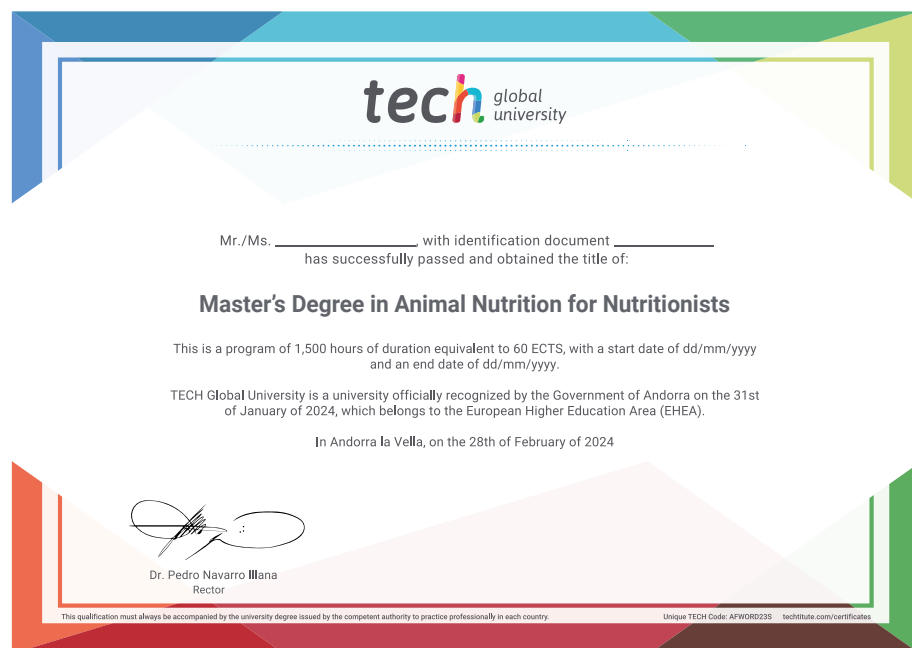
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Master's Degree in Animal Nutrition for Nutritionists**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**



future
health confidence people
education information tutors
guarantee accreditation teaching
institutions technology learning
community commitment
personalized service innovation
knowledge present quality
online training
development language
virtual classroom



Master's Degree Animal Nutrition for Nutritionists

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online

Master's Degree

Animal Nutrition for Nutritionists

