# Advanced Animal Physiology

## Prof. Erminio Trevisi

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

Further students' biochemical-physiological knowledge of the digestive processes, the metabolic use of nutrients, and the cellular regulation mechanisms that support productive and reproductive performance in farm animals. Examine the mechanisms related to nutritional errors that compromise the functioning of the main systems and trigger diseases (metabolic and/or infectious). Provide management criteria that can be used in preventing and/or treating metabolic diseases.

At the end of the course, students will be able to:

* Understand the relationships between diet, digestive changes, immune response, absorbed nutrients and their metabolic use;
* Interpret the aforementioned relationships in relation to an animal's state of health and performance (growth, milk production, fertility);
* Identify the food and management causes of the main metabolic diseases, in particular those connected to the digestive system;
* Recognise the presence of the aforementioned diseases through behavioural, physiological and qualitative changes in production;
* Suggest diagnostic insights for the detection of subclinical cases;
* Indicate possible interventions to treat or prevent these diseases.

***COURSE CONTENT***

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| **Topics** | **ECTS** |
| Introduction to the processes of cell function regulation: perception of external and internal stimuli; transmission of responses via the nervous and endocrine routes; nutrient distribution; regulation of gene expression. Introduction to System Biology. | **1** |
| Furthering students' anatomical and functional knowledge of the digestive system. Regulation of digestive processes (saliva, fermentation, nutrient degradation and absorption in the forestomach, gastric and intestinal digestion). Modulation of rumen fermentation processes.  | **1** |
| Physiopathology of ruminant digestive processes (acidosis and subacidosis; alkalosis; meteorism). Systemic effects, causes and diagnosis. | **1** |
| Physiopathology of gastric diseases (dislocation of the abomasum, ulcers) and intestinal diseases (acidosis, alterations in epithelial permeability).  | **1** |
| Liver and pancreas: functions and metabolic regulation of the availability of nutrients. Endogenous and exogenous factors of appetite regulation.  | **1** |
| Blood. Innate and acquired immune system. Erythrocytes and the main plasma components. | **1** |
| Peripartum endocrine, immune and metabolic adaptations in nutritional status. Health, performance and well-being implications.Description, causes, diagnosis, prevention and therapy of typical peripartum metabolic dysfunctions (placental retention, puerperal collapse, ketosis, abdominal dislocation). | **1** |
| Relationship between nutrition and the onset of conditioned and metabolic diseases (e.g. mastitis, foot diseases, low fertility). Causes, physiological, health and productive consequences, diagnosis. | **1** |

***READING LIST***

Material posted on the dedicated website (Blackboard platform) relating to lectures and activities carried out in the workshops.

R. Bortolami, E. Callegari, P. Clavenzani, V. Beghelli, *Anatomia e fisiologia degli animali domestici,* Edagricole, Bologna, 2009.

A. Poli, E. Fabbri, C. Agnisola, G. Calamita, G. Sansovito, T. Verri, *Fisiologia Animale*. EdiSES, Naples, 2018.

R. Ronchi, G. Savoini, M. Trabalza Marinucci, *Manuale di Nutrizione dei Ruminanti da Latte*. EdiSES, Napoli, 2020.

O.V. Sjaastad, O. Sand, K. Hove, *Fisiologia degli animali domestici*. Casa Editrice Ambrosiana, Rozzano (MI), 2013.

***TEACHING METHOD***

1) Frontal lectures to present the key concepts of the subject, with the opportunity for widespread interaction. The lectures are accompanied by PowerPoint slides, which are subsequently made available to students on the Blackboard platform.

2) Practical lessons in the laboratory and/or stables, aimed at furthering students' knowledge of the main biological fluids used for diagnostic evaluations (rumen, blood, milk).

3) Seminars conducted by recognised experts on specific course topics.

4) Short presentations by students on physiological topics of their particular interest, followed by a critical discussion.

***ASSESSMENT METHOD AND CRITERIA***

The exam is oral and takes place in 2 parts. A short presentation on an in-depth analysis of a topic covered in the course and agreed with the teacher (usually it will be carried out at the end of the course for all students) and an oral exam comprising three questions on general topics, which will then give rise to furthermore specific questions. The oral presentation allows to obtain up to 3 points out of 30. Each oral question is assessed with a mark from 0 (no answer) to 10 (exemplary answer). The mark is assigned on the basis of the following criteria: a) objective knowledge of the topics and mastery of the subjects; b) presentation clarity; c) ability to respond exhaustively to questions, linking different topics. The final grade is out of thirty, in case the overall value overcome 30 points, honors will be conferred.

***NOTES AND PREREQUISITES***

Students must possess a basic knowledge of anatomy, biology, animal nutrition, organic chemistry and biochemistry.

Should the health situation relating to the Covid-19 pandemic not allow face-to-face teaching, remote teaching in synchronous or asynchronous mode will be guaranteed; this will be communicated in good time to students.

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.