Trainees Instructions

EU Module 3.1 - Basic and appropriate biology - Species specific: Ruminants

Development of interactive e-learning modules on specific areas of the Education & Training framework facilitating implementation of DIR 2010/63/EU

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1. Module Description

1.1 Overview

This module - Basic and appropriate biology - Species specific: Ruminants - will introduce you to the basic biology of the most common ruminants used for scientific and educational purposes, namely bovines (*large ruminants*), goats, and sheep (*small ruminants*). It will cover their anatomy and physiology, dietary needs, optimal housing in a research environment, and methods to ensure good health and welfare through best husbandry practices for each species. Additionally, the module will address the impact of various experimental procedures on their welfare, discuss the different strains used in laboratories, and outline best practices for record-keeping.

This module will cover four topics: Exploring Different Views on Animal Procedures, Ethical and Legal Obligations in Animal Science, Introducing a Culture of Care and Good Scientific Practice and Tools, and Platforms for Staying Informed.

If you are visiting the site independently, you should consult the EC Training and Education framework [guidance document](), which provides an overview of training requirements for individuals with different responsibilities under their relevant national legislation. Additional education and training may be necessary to meet national or institutional requirements.

This document offers suggestions for supporting the use of this e-learning module in your education and training. Each module aligns with the learning outcomes specified by the EU Education & Training framework for laboratory animal science. This module, Basic and appropriate biology – species specific (Ruminants) was developed by George Stilwell, from the University of Lisbon, known for his contributions to farm animal welfare, veterinary science, and related fields with extensive experience researching, publishing, and training. In addition, an international Reflection Group panel has further refined the content, while Nuno H. Franco managed overall coordination.

Your collaboration and feedback are greatly appreciated, as the module is currently in the testing phase.

2. Prerequisites and Requirements

No specific prior knowledge is required. However, a basic understanding of searching bibliographic databases and a background in laboratory animal science and/or non-animal methods can be advantageous.

This module is designed to guide you step by step, eliminating the need for prior study.

2.1 Requirements

- Completion of lessons and understanding of learning objectives.
- Participation in knowledge checks and assessments to evaluate understanding.

3. Grading and Completion

Grading will be based on the successful completion of knowledge checks and assessments provided at the end of each module. Upon finishing all parts of the module, students will receive a certificate of completion. If proof of completion for a specific section is required, learners may be asked to take a screenshot of the screen, as each part's completion is indicated. This ensures transparency and verifiability of progress.

4. Textbooks and Reading Materials

The **"References and Further Reading"** lesson provides most references and readings. They comprise scientific articles, sections of books, websites, and videos. Clicking on any link will open a new window to download or visualise the additional material. Several links to further resources can also be found in the module contents to better guide the reader.

The additional materials provide more information on specific topics, tools, and resources.

5. Course Program

The module is organised into one chapter, with lessons and learning objectives as follows:

Chapter	Lesson	Learning objectives
Ruminants	1-13	- Develop an interactive educational resource representing the musculoskeletal, circulatory, gastrointestinal, respiratory, urinary, and reproductive systems, including the udder, through a combination of interactive labeled figures, photos, standard figures, videos, and a multi-window tab. - Present normal values in a table and describe the senses—vision, hearing, smell, taste, and touch—through interactive labeled figures, diagrams, videos, photos, and textual descriptions. - Describe oestrus signs and detection, artificial insemination, pregnancy diagnosis, gestation, parturition, and preparatory behavioral changes through charts, videos, photos, figures, lists, a 3-step process, and labeled interactive figures, as well as detail the clinical identification of labor stages and abortion causes. - Describe colostrum characteristics and role, milk production cycle, milk composition, and milk

		quality through figures, flip-cards, videos, line charts, tables, and an interactive labeled figure.
		• Describe the natural behavior of ruminant species, hierarchy, cohesive and agonistic behaviors, temperament, and promoting positive behaviors through photos, flip-cards, interactive labeled figures, and videos, as well as the potential causes of suffering.
		• Describe dietary requirements, polygastric digestion, and the role and importance of rumination through figures, photos, and videos.
		• Describe main production types and stages, housing in intensive systems, semi-extensive and extensive systems, and sheep and goat production systems through tables, photos, and an interactive graph.
		• Describe breed factors for cattle and sheep through lists and photos.
		• Outline what should be regularly registered for ruminants through a list.

Table 1 - Learning objectives per parts and lessons.

5.1 Progress Tracking

Once you begin working through a module, your progress is tracked, and you can break off and resume your studies at any point. Once the module is completed, the trainee can access any section to refresh their understanding of a topic.

5.2 Module Structure

The module is divided into several parts, and although they were designed to be followed sequentially, they can also be taken iteratively. Please note that a certificate of completion is only issued to learners who complete all module parts. If proof of completion for a specific part of the module is required, the trainee should provide a snapshot of the screen because the module indicates progress after each part is completed.

5.3 In-Depth Explanation Lesson by Lesson

Lesson	Title	LO	Explanation
1	Introduction		Introduction to ruminants with 1 video and 5 photos.

			General description of each species with 16 photos.
2	Basic anatomy	3.1.1	Musculoskeletal represented with 5 interactive labelled figures and 6 photos, 2 figures and 2 videos. Circulatory system represented in 1 interactive labelled figure. Gastrointestinal tract represented with 5 interactive labelled figures, 7 figures and a 4-window tab. Respiratory system represented in 2 interactive labelled figures. Urinary system represented with 2 figures and 1 interactive labelled figure. The female reproductive system, represented with 1 photo, 2 interactive labelled figures and 2 figures. The udder, represented with 2 photos and 1 interactive labelled figure. The male reproductive system, represented with 1 photo and 1 interactive labelled figure.
3	Basic Physiology - Senses	3.1.1	Normal values represented in a table. Vision description represented with 1 interactive labelled figure, 1 diagram and 1 video. Hearing represented with 1 photo. Smell represented with 1 video, 2 labelled figures and 1 interactive labelled figure. Taste description. Touch description with 1 photo.
4	Basic Physiology - Reproduction	3.1.1	Oestrus signs and detection, represented with 1 chart, 1 video, 3 photos and 1 list. Artificial insemination description with 1 figure. Pregnancy diagnosis description with 1 figure. Gestation and parturition represented with 1 table and 1 figure. Preparatory behavioural changes on the calving day represented with 2 lists, 1 photo and 1 labelled interactive figure. Clinical identification (definition) of the stages of labour represented with a 3-step process and 3 photos. Sheep and goats labour stages represented with 4 photos. Abortion causes, represented with 2 lists.

5	Basic Physiology - Milk Production	3.1.1	Colostrum characteristics and role, represented with 1 figure, 3 flip-cards and 1 video. Milk production cycle represented with a 1 line chart. Milk composition and milk quality are represented with 2 tables. Somatic cell count, represented with an interactive labelled figure.
6	Basic Physiology - Behaviour	3.1.1 3.1.2	The natural behaviour of the ruminant species, as prey and gregarious species, represented with 1 photo. Hierarchy, cohesive and agonistic behaviours, represented with 2 photos in 2 flip-cards, 1 interactive labelled figure, and 3 videos. Temperament represented in 1 video. Promoting positive behaviours represented in 1 video. Potential cause of suffering description.
7	Digestion and Dietary Requirements	3.1.5	Describe the dietary requirements, represented with 3 figures and 1 photo. Polygastric represented with figures. The role and importance of rumination are represented with 2 videos and 1 figure.
8	Adequate housing	3.1.6	Main production types and stages represented in 1 table. Housing in intensive systems represented with 11 photos and 1 interactive graph. Semi-extensive and extensive systems represented with 2 photos. Sheep and goat production systems represented with 5 photos.
9	Different breeds	3.1.7	Breed factors for cattle represented with 1 list and 2 photos. Breed factors for sheep represented with 1 list.
10	Records	3.1.9	Record keeping - what should be regularly registered for ruminants, represented in 1 list.
11	Summary		Module summary
12	References and Further Reading		References for additional materials
13	Knowledge-check		Assesses progress and knowledge acquired during the module

Table 2 - Explanation lesson by lesson.

6. Target Audience

This module is intended for (bio)medical researchers, participants in laboratory animal science courses, university students, biology/medical teachers, animal welfare body members, regulators, and anyone interested in learning more about animal research ethics and the principles of Replacement, Reduction, and Refinement of animal use for scientific and educational purposes.

7. Notes

As this is a test run, we kindly request one feedback form for each tested module to ensure we gather thorough insights for every tested module. The majority of the modules are designed to complement other components of your training, and the content should be accessible even if you have relatively little experience working with laboratory animal science. Where appropriate, the introduction to the module suggests pre-reading and suggested training that should be completed before continuing with the module.

7.1 Module Structure

We would greatly appreciate your valuable insights and detailed feedback regarding the instructions provided. Your input will help us ensure clarity, accuracy, and overall effectiveness in conveying the necessary information.

https://forms.uu.nl/universiteitutrecht/TestReview_LASLearning_instructions