LAS-Learning

Course Organisers 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 the implementation of DIR 2010/63/EU

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Suported by:

Partners:

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1. Module Description

a. Overview

This module, *Basic and appropriate biology - Species specific: Ruminants*, will introduce you to the basic biology of the most common farm animals used in research: pigs, fowls, and ruminants. It will cover their anatomy and physiology, dietary needs, optimal housing in a laboratory 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 document provides guidance and suggestions to support the course organiser's efforts. Each module is aligned with the learning outcomes outlined in the EU Education & Training framework for laboratory animal science.

We recommend consulting the EC Training and Education framework guidance document if you are accessing the site independently. This resource offers an overview of training requirements for individuals with different responsibilities under their relevant national legislation.

Further reading and additional education and training may be necessary to meet national or institutional training requirements. At the end of each module, you will find a list of recommended further readings and references cited throughout the content. Links to these references are provided whenever possible.

This module was developed by George Stilwell, a professional known for his contributions to animal welfare, veterinary science, and related fields. His work spans research, publications, and training in these fields. The module was further revised by an international Reflection Group panel, with coordination led by Nuno H. Franco.

The module is currently in the testing phase. We appreciate your collaboration in integrating it into your courses and providing feedback. After completing a module, please fill out the form below with your feedback.

b. Learning Objectives

This module will equip participants with essential knowledge and skills to navigate animal research's ethical, legal, and practical aspects. The key learning objectives include:

1. General introduction.
2. Ruminants.

2. Course Program

The module is organised into different chapters, with lessons and learning objectives for the participants as follows:

Chapter	Lesson	Learning objectives
Ruminants	1-13	Introduction Basic anatomy Basic Physiology - Senses Basic Physiology - Reproduction Basic Physiology - Milk Production Basic Physiology - Behaviour Digestion and Dietary Requirements Adequate housing Different breeds Records Module summary List of references and further reading Assess your knowledge

Table 1 - Learning objectives per parts and lessons.

a. Progress Tracking

Once learners begin working through a module, their progress is automatically tracked. This allows them to pause and resume their studies at any point. Upon completing the module, learners retain access to all sections, enabling them to revisit and review specific topics to reinforce their understanding.

b. Model Structure and Implementation Guidance

The module is structured into several parts, which were designed to be followed in sequence but can also be taken iteratively based on the learner's needs. Please note that a **certificate of completion** is issued exclusively to learners who finish all parts of the module.

From a pedagogical perspective, each tutor is responsible for deciding which materials to use in face-to-face sessions, which parts learners should complete independently, and whether to mandate their completion. However, it is essential to consider the time required to complete the eModule or its parts to avoid overburdening learners.

We highly recommend completing the module to ensure it aligns with your course's content and scope. Familiarising yourself with the material will also enable you to engage more effectively with students on the various topics covered in the eModule.

c. 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.

3. Participants' Profile

This module is intended for (bio)medical researchers, laboratory animal science students, university students, biology/medical teachers, ethical board members, and anyone interested in learning more about techniques for finding non-animal methods/alternatives in research.

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

4. eModule

The eModule provides clear definitions, essential knowledge, and interactive components designed to enhance understanding of key animal ethics theories and develop critical thinking skills. Participants will learn to ethically frame and evaluate animal research from a broad perspective and a case-by-case approach.

The content and references are curated from expert sources, including researchers and information specialists, ensuring high-quality and reliable information. The module is presented dynamically, combining text, images, built-in exercises, and videos to engage learners effectively. It can be integrated into courses as homework or used during a lecture day. Many lessons are designed to deliver comprehensive information and understanding without additional in-class interaction.

a. Limitations

Using domestic ruminants such as cattle, sheep, and goats as models in scientific research presents several limitations and challenges. By acknowledging and addressing these limitations, researchers can better design and conduct studies involving domestic ruminants, ensuring that the benefits of using these animals as models are maximised while mitigating potential challenges.

Searching for alternatives, including assessing (the quality of) the search, reporting, and documentation, is not easy. It requires several tools, practice, and often team efforts to be achieved appropriately. Therefore, not every tool or method could be explained in detail within this eModule. However, references and further reading suggestions open vast possibilities for interested users to learn more about this topic.

b. Blended Learning Approach

E-learning modules offer significant advantages, particularly for learners who may find it challenging to attend traditional intensive training sessions spanning several days. Such sessions can disrupt work schedules and limit participants' ability to balance learning with other responsibilities. While this eModule covers all required learning outcomes, we do not advocate entirely replacing face-to-face teaching (or "live" online discussion sessions) with e-learning. Instead, we recommend a blended learning approach (hybrid or mixed-mode learning). This approach combines the flexibility of e-learning with the engagement of interactive, live sessions, ensuring that learners receive the necessary information while accommodating those who require greater flexibility.

The modules are split into short, manageable lessons, allowing participants to integrate learning activities into their daily schedules seamlessly.

5.Implementing Blended Learning Strategies

Flipped Classroom Arrangement

Before face-to-face classes, learners are introduced to the course contents (for example, by completing our e-learning modules). You can recommend that learners take the whole course (and request a certificate of completion) or focus on specific lessons or chapters.

This approach can:

- Familiarise learners with the content in advance, helping them better understand complex concepts.
- Prepare and motivate learners to engage more actively in their learning and during face-to-face classes.
- Harmonise learners' knowledge levels before in-person classes.
- Provide sufficient background knowledge for group work, allowing for more focused and productive discussions.
- Provide a starting point for interactive discussion.

Consolidate Learning and Prepare for Exams

The courses are designed to align with the learning outcomes of traditional laboratory animal science courses. Learners can use each module to study and prepare for the final exam. Additionally, the built-in quizzes allow learners to test their knowledge and track their progress.

Address Expertise Gaps in Your Facility

Gathering expertise across all subjects covered in the EU-functions modules can be challenging, especially in smaller establishments. This may hinder the ability to deliver training that meets all outcomes of the Education and Training framework to a high standard. Using these modules as a basis, tutors and learners can access quality reference material that could mitigate such gaps and ensure education and training are up to standard.

Use Modules as Teaching Resources

Tutors can integrate various components—such as text, videos, images, interactive exercises, and quizzes—into their teaching activities. This not only boosts engagement but also caters to different learning styles. For each module, we provide suggestions for topics that can be incorporated into interactive discussion sessions.

6. 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. They are ideal for learners who wish to expand their knowledge or gain a more comprehensive understanding of the issues.