

Learning Scenario 7. Biology, pathology and breeding of laboratory animals

The aim of the module is to familiarise the veterinary students with the challenges of laboratory animal science. The module includes both interactive lectures, hands-on training and individually supervised work. This learning scenario will be included into an already existing module, by expanding the space dedicated to replacement and using non-animal models for research. That program is not dedicated to training the personnel for specific functions, or tasks as stipulated by Directive 2010/63/EU, this is why no procedures (like blood sampling, injections, anaesthesia etc) are conducted on laboratory animals during the module. They were all replaced by suggestive videos and on-line resources. However, the students will be trained in proper animal's handling & restraint (mice, rats and rabbits), clinical evaluation (by non-invasive procedures), necropsies (on animals euthanized previously for other purposes), particularities of haematology by using already made blood smears etc. A large part of the program is dedicated to animal ethics & legislation, and how the 3Rs should be implemented in laboratory animal science. The replacement and the concept of non-animal models are already included, but it will be expanded.

Subject	Clear description (title)
Author/owner/ possible copyright issues	Prof. Bogdan Sevastre bogdan.sevastre@usamvcluj.ro University of Agricultural Science and Veterinary Medicine Cluj-Napoca, Faculty of Veterinary Medicine, https://www.usamvcluj.ro/
Topics	3Rs, Laboratory animal science
Eligible student level	Undergraduate veterinary students (Bachelor) Prior knowledge in animal anatomy and physiology.
Teaching time	42 hours; 2 hours interactive lecture, 1 hour laboratory / week for 14 weeks. In addition, the program includes 8 hours of individual study, and other 6 hours for preparing project.
Examples of online teaching material	All the ppt presentations used for the lectures and laboratory, e-books, and other documents are available to students by Google Drive and by the intranet platforms of the university (accessible to staff and students only). Relevant platforms as ETPLAS, NC3Rs and NORECOPA will be used as sources of information and training the students.
Examples of offline teaching material	Of line teaching material will include whiteboard, paper forms (for clinical evaluation), demonstrations, hands-on training and supervised learning.
Helpful resources	Relevant learning tools: https://etplas.eu/ https://norecopa.no/ https://www.nc3rs.org.uk/
Licenses, certification or accreditation	The course has no accreditation by itself, it is included in curricula of Faculty of Veterinary Medicine, study program accredited by EAEVE and ARACIS
Integration in curriculum	This module is integrated in the curricula of Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine Cluj-Napoca. The course will be a stand-alone course.
Examination	The examination will be done by continuous evaluation (open question related to the topic of the lectures and evaluation of the laboratory activity). In the end of the program the students will defend a bibliographical study in the area of 3Rs or other field of laboratory animal science. The certificate obtained by

	following ETPLAS online modules will be also considered for the final grade.
Aims and learning objectives / outcomes	The overall course objective is to introduce the students familiar in the area of laboratory animal science. The students should be able to support opinions related to the ethical dilemmas in animal experiments, to identify the non animal models and replacement possibilities available for the biomedical research, to evaluate the procedure severity and to identify strategies to alleviate it, to be aware on the legislative requirements and to the needs of the main species of laboratory animals. As Direct Observation Procedural Skills (DOPS) the students have to prove that they can handle and examine correctly the most common species of laboratory animals (mice, rats and rabbits).
Activities/ programme	<p>LECTURE</p> <p>I. LABORATORY ANIMAL IN BIOMEDICAL RESEARCH Lecture 1-3 Bioethics of animals experiments, The concept of 3Rs, Non-animal models and replacement strategies in biomedical research. Regulation and control of projects who involve procedures on laboratory animals. International regulations, European regulations (Directive 2010/63/EU). Responsibilities for personal involved in animal experiments, Project authorisation process, Education & Training network in EU.</p> <p>II. BREEDING AND WELFARE OF LABORATORY ANIMALS Lecture 4,5 Legal requirements for establishments for breeding, using and commercialization of laboratory animals. Housing. Emplacement. Shelter. Control of microclimate Veterinary surveillance. Acquisition Transport Quarantine Circulation Hygiene Personal Equipments, Provide a (detailed) overview of the planned activities. Reproduction. Selection Pure lines (consanguinity). Obtaining / maintenance of consanguine lines. Unconventional animals. Gnotobiotic animals. Categories. Applications. Housing and maintenance. Anatomical particularities</p> <p>III. MANAGEMENT OF PAIN AND STRESS IN LABORATORY ANIMALS Lecture 6-7 Generalities about stress. Stress factors in laboratory animals(not related to pain). Generalities about pain. Type of pain usually experienced by laboratory animals, Particularities of pain among laboratory animals. Recognition and assessment of pain and distress. Signs of pain in laboratory animals. Pain assessment by Grimace Scale in mice, rats and rabbits Pharmacologic control of Pain. General anesthesia. Neuroleptanalgesia, Opioid agonists. Non steroidal anti-inflammatory drugs Non pharmacological control of pain. Control of Distress. Pharmacological control of stress and distress. Non pharmacological control of stress and distress. Husbandry management practices Socialization and handling, Environmental enrichment. Euthanasia. General consideration, Indication, Methods used for euthanasia in laboratory animals. Inhalation agents, Physical methods, Non inhalatory pharmacological agents. Euthanasia in different laboratory animals species</p> <p>IV. THE MAIN SPECIES OF LABORATORY ANIMALS Lecture 7-14 Rat, Mouse, Syrian hamster, Guinea pig, Gerbil, Rabbit, Dog, Cat, Ferret, Non-human primates. (Biology. Behavior. Lines. Housing. Nutrition. Reproduction, Basic pathology)</p>

	<p>PRACTICALS</p> <p>Laboratory safety rules, Handling of laboratory animals week 1</p> <p>Modalities to administrate the drugs (videos, on line resurses) week 2</p> <p>Collection of the biological samples (videos, on line resurses) week 3</p> <p>Anatomical particularities of laboratory rodents week 4</p> <p>Clinical examination in mice, rats and rabbits weeks 5, 6</p> <p>Hematology, morphological particularities in the main species of laboratory animals weeks 7, 8, 9</p> <p>Identification of the sex cycle in female rats based on vaginal cytology weeks 10, 11</p> <p>Pain recognition based on grimace scale in mice, rats and rabbits(videos) weeks 12, 13, 14</p>
Assignment	The lecture is held with 30 students; the practical activities with 15 students, but within the group, 3 subgroups of 5 students are made for performing the hands-on activities (group work).
Student and teacher feedback	UASVM Cluj has a procedure to evaluate the satisfaction of the students for every course and professor (online anonymous questionnaire). The results are available to each course leader and it is evaluated by the Quality Evaluation Department of the University. .
Helpful resources	<p>Hrapkiewicz Karen, Leticia Medina (2007). Clinical Laboratory Animal Medicine: an Introduction. 3rd ed, Blackwell Publishing Professional, 2121 State Avenue, Ames, Iowa 50014, USA</p> <p>Directive 2010/63/EU of the European Parliament and of the Council on the protection of animals used for scientific purpose</p>