

Working Party Report

FELASA recommendations for the education and training of laboratory animal technicians: Category A

Report of the Federation of European Laboratory Animal Science Associations Working Group on Education of Animal Technicians (Category A) accepted by the FELASA Board of Management

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Abstract

The future laboratory animal technician in Europe will be provided with three different levels of education. All candidates have to start with an introductory course to reach level A0. At this level (A0) they will be able to assist in the laboratory animal facility by undertaking limited specific duties under supervision. Most A0 assistants will continue their education and training for at least one year while in full-time employment. This process will include continual assessment with the option of a final examination to become qualified at level A1. A1 represents a comprehensively educated laboratory animal technician with theoretical background knowledge and practical skills. Some of the A1 laboratory animal technicians may continue specific education for at least another year of full-time employment. They will develop knowledge and expertise as well as supervisory and basic managerial skills in order to obtain level A2.

Keywords: Animal technician, education, training

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Appropriate education and training of all those engaged in the use of live vertebrate animals for scientific purposes is required by both the Council of Europe and the European Union.^{1–4} The Federation of European Laboratory Animal Science Associations (FELASA) had published recommendations for the education and training of persons working with laboratory animals for Categories A and C.⁵ For Category A an education was described on four levels, from basic laboratory animal care (level 1) to higher management or specialization (level 4).

The FELASA Working Group for the revision of Category A has looked over the 1995 recommendations critically and is now delivering a revised and simplified educational concept for Category A that will completely replace the FELASA recommendations of 1995. The proposal describes the recommended education of future Laboratory Animal Technicians. It does not consider existing staff members, who already work as laboratory animal technicians, but do not have the respective education. However, such staff may undertake this new course of study if they so wish. It does not consider other assisting personnel who have no direct animal-oriented tasks or duties.

The situation in the countries of the FELASA member associations is multifarious and recommendations for the education of laboratory animal technicians have to consider that. The recommendations must be kept more general in several respects, not least to provide a better opportunity for countries to adapt their current educational systems to the FELASA recommended concept in a step-by-step manner.

In general, the Working Group proposes Category A education on a binary basis, i.e. students are trained in two different institutions. These are the educating institution (employer, e.g. university, pharmaceutical firm) and the vocational school or provider of special courses, e.g. distance/online learning.

The future European laboratory animal technician (Table 1) may enter the education with an introductory course of 30 h, including theoretical and practical training by achieving level A0. At this level, which is only an introductory level, the staff will be able to assist in the laboratory animal facility by undertaking limited specific duties under supervision.

It is recommended that the A0 course is followed by further formal practical and theoretical training, while students complete a minimum of one year full-time equivalent

Table 1 Proposed education and training timelines for different levels of FELASA Category A technician

Degree	A0	A1	A2
Precondition	Successful completion of school education	Accomplished A0 level	Successfully passed A1 exam
Duration	30 h introductory	Min. one year	Min. one year
Education	20 h theory 10 h practical	200 h theory 200 h practical	200 h theory 200 h practical

of work experience. During this time, regular assessments of competency and understanding should take place along with a final evaluation of the students' ability; successful students would then be at level A1.

After at least another year practical experience and successful completion of the A2 syllabus, the Laboratory Animal Technician should have achieved additional experimental and supervisory skills and thus can obtain level A2.

Progress from one level to the next is not automatic. Indeed, considering the staffing structure of an animal facility, it is obvious that not all those persons succeeding at one level will seek or be able to enter the next.

It is foreseeable that conditions in the field of biomedical research will change in the future. New techniques may be developed and other species may be required for laboratory use. Under these circumstances, the education of laboratory animal technicians must not end with the final exam, it has to continue throughout their entire professional life. The concept of continuing professional development must therefore be recognized in order to ensure the well-trained professional laboratory animal technician of the future.

Recognition of previous educational achievement

Where students are able to provide formal evidence of successful educational and/or training achievement in relevant subject areas (at a level equal to or greater than the category

of education and training being undertaken), then exemptions from appropriate sections of the course may be granted on a 'case-by-case' basis. Importantly, such exemption should be limited to educational/training achieved within the last eight years.

FELASA Category A0 (A zero)

General: Personnel may enter this level from a variety of working backgrounds, age groups and educational abilities, but evidence of the successful completion of school education is required. Candidates have to be literate, numerate and with some understanding of basic secondary school level science. Interest in animals and the acceptance of the need to carry out routine tasks associated with proper maintenance and care of the animals is an essential prerequisite.

Activities and responsibilities

- Competent handling of relevant species.
- Competent transfer of animals between housing units, e.g. cage, pen or tank.
- Feeding and watering of animals.
- Cleaning of animal rooms.
- Disposal of waste.
- Recording room temperature and relative humidity and report.
- Autoclaving maintenance equipment.
- Transportation of animals within the facility.
- Cage washing and filling with bedding.
- Cage transportation.
- Store keeping.
- Replenishment of consumable items.

Teaching syllabi for Category A0

Suggested main topics and learning outcomes (Table 2)

In order to achieve the A0 level, candidates have to go through an introductory course. The course consists of

Table 2 Suggested main topics and learning outcomes expected of A0 personnel

Topic	Theory	Formal practice
Hygiene and supplies	Understand and respect the basics of hygienic rules. Understand the safe and correct use of cleaning and sterilizing equipment. Define the principle of hygienic zones.	Keep a hygienic and tidy facility with adequate supplies of clean cages, bottles and consumable items. Keep the store tidy. Dispose waste appropriately.
Husbandry	Explain suitable feeding regimes and choose adequate methods of providing food and water. Indicate suitable housing, bedding and enrichment. Indicate techniques for the safe and competent handling and transport of appropriate species.	Provide animals with adequate food and water and maintain them according to standard requirements. Provide suitable housing, bedding and enrichment. Record temperature and relative humidity and report measurements according to the rules of the facility. Employ techniques for the safe and competent handling of appropriate species. Transport animals within the facility correctly and safely.
Safety	Recognize the need for safe working practices and the use of personal protective equipment.	Work in a safe manner.
Ethics and legislation	Appreciate the need for animal use and legal protection of animal welfare. Dispose of basic knowledge of relevant national legislation. Consider society's concerns about animal use.	Work in accordance to legal rules.

theory and practical training: a total of 30 h (20 h theory, 10 h practice). At the end of the course candidates must achieve competency in basic practical skills, e.g. animal handling.

FELASA Category A1

General: While undertaking level A1, students will either demonstrate or acquire basic knowledge in biology, general science (physics, chemistry, history of laboratory animal science, concepts of experimental testing), mathematics, information technology (computer use) and communication (i.e. competent in both oral and written expression). It is recognized that at this level students should receive credits for prior learning where qualifications of a similar or higher standard are held. Precondition for starting education for level A1 is the FELASA Category A0 degree.

Depth in which topics need to be dealt with: Modules completed in level A1 will result in successful students achieving a general understanding of the husbandry and welfare practices found within a laboratory animal facility. This will be underpinned by theoretical background knowledge and the ability to demonstrate competency in the practical skills required by laboratory animal technicians in their day-to-day work.

Hours of theory and practical: A total of 200 h theory and 200 h formal practical training and one year working under supervision in the workplace or approved educational establishment is required to build up experience. This may be undertaken while in full-time employment during which time students are supervised on a day-to-day basis. After graduation they should be competent to perform animal care routines and procedures following instructions, standard operating procedures and protocols.

Examination requirements: A process of continual assessment with the option of a final examination. Declarations of practical competency may be awarded at any time during the training period. Once practical competency is achieved, individuals may then work without immediate supervision for that specific training activity.

Teacher requirements: A combination of specialist teaching staff is recommended, each to be competent in their subject area. These may include individuals who have successfully completed Categories A2, B, C and D.

Activities and responsibilities

These are applicable to vertebrate animals housed within conventional, specified pathogen-free and barriered areas and/or aquatic systems. These may also include isolators, individually ventilated cages, quarantine units and other containment/isolation systems.

- Competent handling, restraint and sexing (including age determination based on physical characteristics) of the common, most frequently used laboratory animal species.
- Daily maintenance of conventional and/or genetically altered animals to include: establishing breeding

groups/lines under direct supervision; recognition of mating and pregnancy signs; weaning; maintenance of computer and/or paper breeding records; and preparation of breeding performance data.

- Receipt, checking and housing of incoming animals (in-house/commercial sources); issuing; and maintenance of defined paperwork and recording systems.
- Acclimatization, socialization and training of animals.
- Identifying animals by appropriate marking systems suitable for the animal species.
- Cleaning, feeding and watering of experimental, breeding and other animals. Daily observation and inspection of animals for general condition (including noting food/water intake). Reporting any variance of experimental animals to the investigator.
- General maintenance of animal housing equipment and room(s): cleaning, disinfecting; replenishment of consumable items, etc. Involvement in general microbiological monitoring procedures, e.g. sampling, effective functioning of washing and sterilization equipment.
- Recording animal room environment (temperature, humidity, light, etc.) and room procedures (daily activities in the room). Reporting any variance outside specified limits.
- Conduct of minor procedures, e.g. blood sampling, drug administration and biopsy of tissues for genotyping (it is recognized that additional legal requirements in some countries may preclude all laboratory animal technicians from undertaking the minor procedures detailed above).
- Postoperative care of experimental animals; assistance to researchers with animal handling and restraint; and maintenance of animals on specific experimental projects including recording of observations, e.g. body weight.
- Recognition of wellbeing, discomfort, distress and pain.
- Perform competently an appropriate method of euthanasia on relevant species in compliance with established procedures and/or legal requirements. Participation in necropsies, e.g. experimental purposes, animal health surveillance programmes.

Teaching syllabi for Category A1

Suggested main topics and learning outcomes (Table 3)

The learning outcomes refer to what a student will be able to do on successful completion of Category A1. The active verbs used will test the comprehension of the student for each subject area and allow application of new learning in a practical situation.

FELASA Category A2

Entry qualification: The continuing development of knowledge and expertise plus the acquisition of supervisory and managerial skills would form the basis of duties undertaken at this level. Personnel obtaining level A2 would be expected to have successfully completed level A1 or equivalent qualification and experience. It is recognized that even at level A2, as recommended for level A1, students should

Table 3 Main topics and learning outcomes to be undertaken and demonstrated by A1 personnel

Topic	Theory	Formal practice
Basic biology of the frequently used laboratory animal species	Describe anatomical structures and organ systems. Explain physiological processes and relate them to anatomical structures. Indicate the main behavioural requirements.	Denominate body parts of living animals of the most frequently used species.
Housing and care	Explain the biological needs of laboratory animals in relation to care and husbandry practices. Indicate the standards of care and husbandry of laboratory animals required to meet national and European regulations and codes of practice. Define the concept of a barrier system. Explain function and use of IVC systems.	Apply working practices to maintain the integrity of the barrier in relation to microbiologically defined and genetically modified animals. Keep animals of unknown health status and those experimentally infected with potentially hazardous material in separated units. Demonstrate the proper use of IVC systems and cage changing stations. Fulfil the requirements involved in the maintenance of isolator-reared animals.
Animal handling	Outline the reasons for, and the importance of correct handling of laboratory animals. Explain accurately the variety of techniques employed for the safe and competent handling of the most frequently used laboratory species.	Select an appropriate handling method based on physical characteristics, behavioural and individual traits of the species concerned. Pick up and hold animals using methods that are safe and acceptable to both the animal and handler. Remove animals competently from, and return them to, a variety of cage types for mammalian maintenance as well as holding systems for birds and aquatic species. Determine the age and sex in a wide range of species using a variety of external features. Select appropriate methods of physical restraint relating to animal care and scientific procedures.
Care and husbandry	Explain the need for animal care routines with special reference to meeting species-specific physiological and behavioural requirements. Indicate the housing, maintenance and breeding of rodents and other relevant laboratory animal species, with special respect to genetically altered animals. Indicate special care needs, e.g. for breeding or experimental animals. Indicate the purpose of animal caging; features of good cage design relevant to the species and purpose for which the animal is being kept. Indicate the need for the provision of bedding and nesting material where appropriate and argue for the selection and suitability of materials available for this purpose. Declare the meaning of acclimatization, socialization and training of animals. Explain the significance of environmental enrichment in relation to animal welfare and other contributory factors to improving care and husbandry regimes. Indicate the need for individual animal identification and the application of appropriate methods of marking for each species.	Provide clean cages with adequate bedding and nesting material. Provide suitable feeding regimes and apply suitable methods of providing food and water. Accustom animals to new cages and social partners. Identify animals using different marking methods.
Nutrition	Indicate factors influencing the choice of diet and feeding practices; effects of specific treatments on nutritional content, e.g. sterilization. Declare the basic nutritional components of animal diets and their presentation; particular dietary needs of some species and breeding or growing animals. Explain the necessity for a constant source of drinking water.	Comply with the nutritional requirements of laboratory animals through appropriate selection of the types and composition of laboratory animal diets, including special features of aquatic animals. Apply appropriate methods for presentation of drinking water.
Breeding	Describe the basics of the biology of reproduction in a range of laboratory animal species, including aquatic species.	Use common breeding systems and explain the practical considerations in establishing and maintaining such programmes, with special reference to genetically modified animals.

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Table 3 Continued

Topic	Theory	Formal practice
Animal facility routines	Indicate the necessity for regular cleaning of animal rooms and service areas. Indicate the need for monitoring and recording environmental and microbiological conditions within the unit.	Adhere to defined cleaning regimes within the facility. Use and handle cleaning and sterilization equipment safely and correctly. Prepare correct dilutions of disinfectants. Monitor and record environmental and microbiological data according to guidelines of the facility. Attend to personal hygiene and adhere to specified working practices and procedures for the protection of staff and animals.
Disease prevention and control	Indicate the need for, and importance of, health and welfare checks and the recording and reporting of any remarks by appropriate means and terminology. Be aware of common disease problems in a range of laboratory animal species; recognition of the signs of disease; zoonoses. Indicate the importance of disease prevention and control and of health surveillance programmes.	Recognize behavioural and clinical signs of ill health plus signs (both general and specific for the species concerned) that could indicate a deviation from normal health and wellbeing and consider the action to be taken.
Euthanasia	Explain the reasons for, and the definition of euthanasia. Indicate suitable methods of euthanasia for a range of laboratory animal species; legal restrictions or recommended guidelines for performing such methods. Explain factors influencing the method of choice and methods for confirmation of death.	Perform accurate methods of euthanasia according to guidelines of the facility.
Environment	Consider the environmental factors in relation to the normal range for laboratory animal species. Explain possible consequences of an inappropriate environment.	Monitor and report environmental recordings.
Safety	Indicate the need for safe working practices and to implement local protocols and national legislation concerning health and safety in the workplace.	Apply containment procedures for biological (including genetically modified organisms), chemical and other hazards; for safe handling of equipment and supplies; as well as for personal hygiene and the prevention of laboratory animal allergy.
Legislation/ethics	Debate the ethical implications of the use of animals for biomedical research. Understand and explain the concept of the 3Rs and the use of alternatives. Be aware of GLP regulations.	Have a working knowledge of national legislation controlling the use of animals for scientific purposes and be aware of other relevant legislation including codes of practice.
Animal welfare	Exemplify the role of environmental enrichment in animal welfare.	Recognize normal and abnormal animal behaviour; and relate these signs to an estimation of wellbeing or pain, ill health and distress.
Additional topics	Use computers for investigations on the web and writing records. Be aware of rules of communication and their impact.	Perform minor (non-surgical) experimental procedures. Use computers for routine work. Communicate with customers and colleagues.

IVC: individually ventilated cage; GLP: good laboratory practice

receive credits for prior learning where qualifications of a similar or higher standard are held.

Depth in which topics need to be dealt with: Successful completion of level A2 modules will enable career-oriented, professional laboratory animal technicians to demonstrate and apply theoretical knowledge to key specialized and/or supervisory roles. It is recognized that successful completion of level A2 training will enable laboratory animal technicians to undertake a range of experimental procedures, thereby increasing the expertise available for *in vivo* research programmes.

Hours of theory and practical: Full A1 education plus 200 h theory plus 200 h of formal practical training plus one additional year of practical experience.

Examination requirements: A process of continual assessment with the option of a final examination. Declarations of practical competency may be awarded at any time during the training period.

Teacher requirements: See *Teacher requirements* for FELASA Category A1.

Activities and responsibilities

- Organization and supervision of the animal care and husbandry routines.
- Planning of daily work routines and staff rotas.
- Coordination of resources to meet demands.
- Participation in management of departmental budgets.

Table 4 Main topics and learning outcomes to be undertaken and demonstrated by A2 personnel

Topic	Theory	Formal practice
Management of the animal facility	<p>Understand the importance of procedures and policies for the efficient and safe operation of the animal facility; preparation of reports.</p> <p>Understand the basic function of air-conditioning and other technical systems.</p>	<p>Support the management of the facility; care for effective use of resources, the management of budgets, the working relationships within and outside the department.</p> <p>Implement (under supervision) procedures and policies for the efficient and safe operation of the animal facility; preparation of reports.</p> <p>Use computer-assisted management programmes for the management of animals, facilities and planning of work.</p> <p>Be aware of the general principles of staff management.</p> <p>Monitor data of room climate, light regime and other technical systems.</p>
Communication and information technology	<p>Be aware of the various communication techniques.</p> <p>Develop a teaching and training programme for junior staff.</p>	<p>Communicate clearly and effectively using a variety of formats.</p> <p>Use basic software packages as applicable.</p> <p>Perform teaching and training of junior staff.</p>
Nutrition	<p>Manage the nutritional requirements of laboratory animals in theoretical terms including formulation and provision of special diets.</p> <p>Consider implications of variation in dietary composition and factors influencing storage and use.</p>	<p>Manage the nutritional requirements of laboratory animals in practical terms including provision of special diets.</p> <p>Order quality assurance testing.</p>
Breeding	<p>Explain the rules of the management of animal breeding colonies, including production and maintenance of genetically defined, outbred and inbred strains as well as genetically altered lines and genetic monitoring procedures.</p> <p>Apply genetic principles in the breeding of genetically defined strains and genetically altered lines.</p> <p>Define breeding programmes</p>	<p>Monitor breeding performance; maintain records; apply criteria for selection of a breeding stock.</p> <p>Apply breeding programmes in the breeding of genetically defined strains and genetically altered lines.</p> <p>Use appropriate breeding programmes for such stocks and strains.</p>
Ill health, disease prevention and control	<p>Describe the importance of disease prevention and control; the possible effects of disease including subclinical disease and medicaments on experimental results and breeding performance.</p> <p>Explain the importance and implementation of health surveillance programmes.</p> <p>Describe the microbiological procedures associated with screening programmes; interpretation of results; factors affecting action taken; health monitoring schemes.</p> <p>Indicate physiological and behavioural aspects of stress; types of stressors.</p>	<p>Collect samples and/or identify appropriate stock for health surveillance programmes.</p> <p>Identify signs of stress in species attended.</p>
Experimental procedures	<p>Indicate factors influencing choice of route and method; volumes and frequency of sampling and dosing.</p> <p>Be aware of the role and responsibilities of personnel involved and the appropriate lines of communication.</p>	<p>Administer substances to experimental animals by common routes.</p> <p>Prepare dosing material and solutions; in relation to dosing volumes and frequency of dosing.</p> <p>Demonstrate the methods for removal and collection of body fluids, faeces, urine and tissues.</p> <p>Use the correct methods in the storage of biological samples.</p> <p>Provide pre- and postoperative care to experimental animals.</p> <p>Recognize signs of pain, discomfort and distress in the relevant species.</p>
Anaesthesia and analgesia	<p>Indicate principles of anaesthesia and analgesia management.</p> <p>Indicate the rationale of the choice and administration of anaesthetic and analgesic agents; species peculiarities.</p> <p>Be aware of possible anaesthetic emergencies and post-anaesthetic care.</p> <p>Understand the principles of anaesthesia and analgesia.</p>	<p>Operate elementary anaesthetic and monitoring equipment.</p> <p>Assist anaesthetist in anaesthetic emergencies and ensure pain control during post-anaesthetic care.</p> <p>Give premedication; monitor and maintain procedures of the anaesthetized animal.</p>
Surgery	<p>Indicate the principles of surgery and basic surgical techniques.</p> <p>Identify common suturing materials and techniques.</p> <p>Be aware of complications and remedial action; recognition and control of infection and pain.</p> <p>Denominate principles of diagnostic and monitoring equipment, e.g. imaging techniques, endoscopy, electrocardiography and electroencephalography</p>	<p>Assist with aseptic techniques; surgical instruments and their application.</p> <p>Monitor wound healing.</p> <p>Organize sterilization of instruments and consumables used in operating theatre.</p> <p>Provide pre- and postoperative care.</p>

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Table 4 Continued

Topic	Theory	Formal practice
Euthanasia	Assess the factors to be considered when selecting a suitable method for euthanasia.	Demonstrate correct methods of euthanasia.
Transportation	Be aware of national and international regulatory requirements and documentation. Be aware of animal welfare issues.	Organize hiring of official carrying agents. Provide appropriate packaging of the animals.
Animal welfare	Be aware of physiological and behavioural aspects of stress. Denominate types of stressors.	Identify physiological and behavioural aspects of trauma and pain. Provide appropriate housing conditions including environmental enrichment.
Legislation	Debate the ethical implications of the use of animals for research. Consider the concept of the 3Rs and the use of alternatives. Be aware of international acts, orders, regulations, schedules and codes of practice relevant to the working of an animal facility.	Comply with national acts, orders, regulations, schedules and codes of practice relevant to the working of an animal facility.

Formal practice (Note: Subject to appropriate legislative requirements being met)

- Ordering of animals, equipment and supplies.
- Management of animal breeding colonies, including re-derivation programmes.
- Arranging despatch, transportation and receipt of animals. Knowledge of welfare and national and international regulatory requirements.
- Assistance in research projects and involvement in experimental protocols.
- Providing advice regarding compliance with relevant legislation.
- Implementation of environmental and microbiological monitoring procedures including health surveillance programmes.
- Participation in the training and development of staff.
- Contribution to aspects of animal welfare (e.g. refinement of techniques).
- Preparation of reports, etc. which may require some knowledge of data management and statistics.
- To guide and assist new trainee animal care personnel to achieve routine care procedures to the expected standard.

Teaching syllabi for Category A2

Suggested main topics and learning outcomes (Table 4)

Definition of terms and role of people:

- *Laboratory animal assistant (A0)*: Persons assisting the laboratory animal technicians by undertaking basic routine, hygiene and animal care tasks.
- *Laboratory animal technician (A1)*: Persons mostly involved in the breeding and care of laboratory animals, whereas some of whom give routine help with experiments.
- *Laboratory animal technician (A2)*: Persons responsible for the breeding and care of laboratory animals and also

- help routinely with experiments and/or supervise and train junior staff. It is recommended that A2 laboratory animal technicians adhere a supplementary education to qualify as Category B persons too. In some countries this is a legal requirement for people involved in experimental settings with live animals.
- *FELASA Category B*: Persons carrying out or assisting in animal experiments.

Relevant websites

Candidates should be aware of the relevant national and international websites relating to laboratory animal science and welfare.

REFERENCES

- 1 Council Directive of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Member States regarding the protection of animals used for experimental and other scientific purposes (86/609/EEC), 1986
- 2 Directive of the European Parliament and of the Council on the protection of animals used for scientific purposes. Proposal 2008/0211 (COD), 2008
- 3 ETS 123. *European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes*, Strasbourg, 18.III.1986
- 4 European Parliament. *Report on Directive 86/609 on the Protection of Animals used for Experimental and other Scientific Purposes (2001/2259 (INI))*. Strasbourg, 2002
- 5 FELASA recommendations on the education and training of persons working with laboratory animals: Categories A and C: Reports of the Federation of European Laboratory Animal Science Associations Working Group on Education accepted by the FELASA Board of Management. *Lab Anim* 1995;29:121–31

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