
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

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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 (Convention ETS 123, Article 26) and the European Union (Council Directive 86/609/EEC, Article 14).

FELASA has elaborated these requirements in practical detail, for this purpose dividing those involved into 4 Categories (although these Categories need not be mutually exclusive): Category A—persons taking care of animals; Category B—persons carrying out animal experiments; Category C—persons responsible for directing animal experiments; Category D—laboratory animal science specialists.

FELASA has based its recommendations on functions—which are common to all, rather than on nomenclature—which differs from country to country. The teaching syllabus published here in detail for Category C provides a common basis for other Categories where functions are similar, while the section 'Animal care/husbandry' of Category A Level 1 should satisfy the requirement of Article 14 of the Directive that 'persons carrying out or supervising the conduct of experiments' (Categories B and C) 'shall . . . be capable of handling and taking care of laboratory animals'. Practical, theoretical and ethical aspects should be treated for all Categories. Refinement of techniques, reduction in the number of animals used and replacement wherever possible by non-sentient systems should be guiding principles.

The FELASA recommendations for Categories A and C are presented here. Those for Categories B and D are to follow.

CATEGORY A—PERSONS TAKING CARE OF ANIMALS*

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In Category A, expertise may be regarded as falling into four Levels, attainment of

each—together with the relevant experience specified—where appropriate serving as the entry requirement for the next Level:

- Level 1—basic laboratory animal care
- Level 2—Level 1 with at least 2 years experience
- Level 3—Level 2 plus at least 3 more years experience
- Level 4—higher management or specialization.

The duties and responsibilities of persons at all four Levels and the teaching syllabuses for Levels 1, 2 and 3 are set out below. The diversity of function of persons

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at Level 4 makes a formal syllabus inappropriate: opportunities for appointment will depend on national circumstances and recognition is likely to be based on individual experience and managerial assessment.

The syllabuses outline the subject matter appropriate for the education and training of animal care staff at each of the other Levels, and draw upon the whole of the FELASA syllabus for Category C (except for items A1, D2 and H) taught to appropriate depths, together with facility management and design considerations for Level 3. Subjects listed for one Level may need to be studied in greater depth for another; an example is legislative and ethical considerations.

The number of hours of formal training appropriate to Levels 1, 2 and 3, and the relevant work experience (expressed as years) needed to qualify for entry to undertake such training, varies among those countries where training courses are already in place. This is largely due to the approach taken to the balance and timing of theoretical and practical instruction and to whether or not formal attainments are required before entry to Level 1 training. While the practical detail and implementation of formal training of animal care staff remains a matter for each country, a mixture of formal education and practical work training over some 4 to 5 years is usual for Levels 1 and 2 together, qualifying for entry to Level 3.

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. This may pose a problem for those stopping at Level 1 where actual basic care is an essential component of the tasks to be performed. Irrespective of background knowledge a certain level of practical competence needs to be demonstrated. Existing schemes usually require something in the region of a year of closely supervised practical working to satisfy this criterion, any theoretical studies being in addition to, or incorporated with such practical training, or both.

FELASA Category A—Level 1

All duties to be performed under the close supervision of an experienced care person.

Ability to: adhere to established working practices and procedures; follow verbal or written instructions; communicate both verbally and in writing.

Academic or appropriate professional qualifications are not normally required for entry at this Level, but in the Netherlands undertaking a formal course of instruction is a legal requirement. Previous experience not essential (except in the Netherlands) although a general interest in animals and the acceptance of the need to carry out routine tasks associated with their proper maintenance and care is important.

Personnel may enter this Level from a variety of working backgrounds, age groups and academic abilities.

Activities may include

GENERAL DUTIES/OPERATION OF SERVICE EQUIPMENT

1. Operation and daily maintenance of equipment e.g. cage/bottle washing machines, cleaning and sterilization equipment.
2. General cleaning and hygiene of service areas, corridors etc.
3. Waste disposal.
4. Collection, unloading and stacking of supplies.
5. Involvement in general microbiological monitoring procedures e.g. water/air sampling, effective functioning of sterilization equipment.

ANIMAL CARE/HUSBANDRY

1. Cleaning, feeding and watering of experimental, breeding and other animals.
2. Competence in basic handling of the common laboratory animal species.
3. Daily observation and inspection of animals for general condition (including noting food/water intake). Reporting any variance to supervisor.

4. Restricted methods of euthanasia following well defined procedures e.g. inhalation of a rising concentration of carbon dioxide gas.
5. General maintenance of animal room(s): cleaning; replenishment of consumable items etc.
6. Recording animal room environment (temperature/humidity etc.) and room procedures (daily activities in the room). Reporting any variance outside specified parameters.

SAFETY

Adherence to standard procedures regulating safe conduct in the unit, correct handling of substances, protection from animal allergens, personal hygiene, vaccination programmes etc. Awareness of personal and collaborative responsibilities for safe working practices.

LEGISLATION/ETHICS

An awareness of national legislative controls and ethical aspects of animal use.

FELASA Category A—Level 2

The duties listed below are a development and extension of the experience and practical skills acquired at Level 1. The application of increasing knowledge to work in a variety of specialized animal facilities and with an increasing range of species, including those requiring particular husbandry skills, would be a basic requirement.

The ability to work for longer periods without direct supervision, and to take responsibility for the daily routines in assigned animal room(s) and other specific duties to an accepted standard would apply at this Level.

In general, a minimum of 2 years previous experience and attainment of the first professional qualification would be a prerequisite for entry at this level. The requirement of the Netherlands for attendance at a nationally recognized course of instruction must also be taken into account.

Activities and responsibilities may include

ANIMAL CARE/HUSBANDRY

1. Responsibility for routine animal care and maintenance regimens in assigned rooms for experimental, breeding and other animals in:
 - conventional, Specified Pathogen Free and barriered areas; flexible film isolators; quarantine units and other containment/isolation systems.
2. Competent handling, restraint and sexing (including age determination based on physical characteristics) of a range of common and less common laboratory animal species.
3. Daily maintenance of non-inbred and genetically defined animal breeding colonies to include:
 - establishing breeding groups/lines under direct supervision; weaning;
 - maintenance of computer and/or paper breeding records; preparation of breeding performance data.
4. Perform competently a variety of methods of euthanasia on a range of species in compliance with established procedures and/or legal requirements.

RESPONSIBILITY FOR DEFINED TASKS/PROCEDURES

1. ANIMAL RECEIPT/ISSUE

Receipt, checking and housing of incoming animals (in-house/commercial sources); issuing; maintenance of defined paperwork and recording systems.

2. ASSISTANCE IN EXPERIMENTAL PROCEDURES

Post-operative care of experimental animals; assistance to researchers with animal handling and restraint; maintenance of animals on specific experimental projects including recording of observations e.g. body weight.

3. NECROPSIES

Participation in necropsies for e.g. experimental purposes, animal health surveillance programmes.

4. NEW TRAINEES

To work alongside, guide, and assist new trainee animal care personnel to achieve routine care procedures to the expected standard.

5. DEPUTIZATION

To take over specific tasks as directed in the absence of immediate supervisor.

FELASA Category A—Level 3

The continuing development of knowledge and expertise and the acquisition of supervisory and managerial skills would form the basis of duties undertaken at this Level.

Personnel moving into this Level would be expected to have a minimum of a further 3 years experience (i.e. 5 years in all) and to have gained an additional professional qualification.

Activities and responsibilities may include

1. Organization and supervision of the animal care and husbandry routines.
2. Planning of daily work routines and staff rotas.
3. Co-ordination of resources to meet demand.
4. Participation in management of departmental budgets.
5. Ordering of animals, equipment and supplies.
6. Management of animal breeding colonies, including rederivation programmes.
7. Arranging despatch, transportation, receipt of animals. Knowledge of welfare and national and international regulatory requirements.
8. Advising research workers on animal supply and allocation of resources to meet scientific requirements.
Assistance in research projects.
Monitoring of legislative compliance.
9. Supervision of environmental and microbiological monitoring procedures including health surveillance programmes.
10. Participation in the training and development of staff.

11. In the absence of the line manager, responsibility for additional duties as directed.
12. Contribution to aspects of animal welfare (e.g. refinement of techniques).
13. Preparation of reports etc. which may require some knowledge of statistics.

FELASA Category A—Level 4

Personnel at this Level would be senior managers with considerable skills in the management and direction of an animal facility. This level of seniority, together with the theoretical and practical knowledge of laboratory animal science required to perform such a function, may extend into the FELASA Category D definition of laboratory animal specialist.

They may go on to acquire further qualifications in laboratory animal science in general or specialist subjects within the field.

Activities and responsibilities may include

1. Co-ordination of resources to meet departmental and organizational needs.
2. Initiation, establishment and implementation of policies and procedures applicable to the department and those using the services provided by the department.
3. Financial control of departmental budgets.
4. Direction of animal care staff at all levels.
5. Organization of training and development programmes for animal care staff.
6. Staff recruitment.
7. Collaboration with scientific staff on the provision of resources to meet research programmes.
8. Participation in the design and execution of experimental work.
9. Liaison with responsible authorities as required.
10. Design of new animal facilities or improvement of existing buildings or areas.

Teaching syllabus for Category A, Level 1

SUGGESTED MAIN TOPICS

Animal handling

Understands:

- the reasons for, and the importance of, correct handling of laboratory animals.
- the variety of techniques employed for the safe and competent handling of the more common laboratory species, and the selection of an appropriate method based on physical characteristics, behavioural and individual traits of the species concerned.

Demonstrates on the more common laboratory species:

(rat, mouse, guineapig, hamster, rabbit)

- the ability to pick up and hold animals using methods that are safe and acceptable to both the animal and handler.
- the ability to remove animals competently from, and return them to, a variety of cage types.

Care and husbandry

Understands:

- the need for animal care routines with special reference to meeting biological and behavioural requirements.
- appropriate maintenance programmes for the common laboratory species such as the rat, mouse, guineapig, hamster, rabbit.
- special care needs e.g. breeding, experimental animals.
- the basic nutritional components of animal diets and their presentation; particular dietary needs of some species or e.g. breeding animals.
- suitable feeding regimens; methods of providing food.
- the necessity for a constant source of drinking water; appropriate methods of presentation.
- the purpose of animal caging; features of good cage design relevant to the

species and purpose for which the animal is being kept.

- the need for the provision of bedding and nesting material where appropriate; the selection and suitability of materials available for this purpose.
- the meaning of environmental enrichment in relation to animal welfare; contributory factors in care and husbandry regimens.

Animal facility routines

Understands:

- the necessity for regular cleaning of animal rooms and service areas and adherence to defined cleaning regimens within the facility.
- the correct use and safe handling of cleaning and sterilization equipment.
- the need for monitoring and recording environmental and microbiological conditions within the unit.
- the need for personal hygiene; the importance of adhering to specified working practices and procedures for the protection of staff and animals.

Animal health checks

Understands:

- the need for and importance of health checks, the signs (both general and specific for the species concerned) that could indicate a deviation from normal health and well-being and the action to be taken.

Euthanasia

Understands:

- the reasons for, and definition of, euthanasia.
- the methods most commonly used, with particular reference to carbon dioxide inhalation.
- the factors to be considered when selecting a suitable method.

Legislation/ethics

Has an awareness of national and European legislation in place to control the use of animals for scientific purposes and the ethical issues concerning such use.

Teaching syllabus for Category A, Level 2

SUGGESTED MAIN TOPICS

Housing and care

Understands:

- the biological needs of laboratory animals in relation to care and husbandry practices.
- the standards of care and husbandry of laboratory animals required to meet national and European regulations and codes of practice.
- the concept of a barrier system; working practices to maintain the integrity of the barrier in relation to microbiologically defined animals, those of unknown health status and those experimentally infected with potentially hazardous material; maintenance of isolator-reared animals.

Handling

Demonstrates the knowledge and competence to:

- determine the age, handle and sex a wide range of species using a variety of methods.
- select appropriate methods of restraint relating to animal care and scientific procedures.

Breeding

Understands:

- the biology of reproductive systems in a range of laboratory animal species.
- breeding systems in common use; practical considerations in establishing and maintaining such programmes.
- monitoring of breeding performance; maintenance of records; criteria for selection of breeding stock.
- application of genetic principles in the breeding of genetically defined strains; definition of genetic strains; appropriate breeding programmes.

Euthanasia

Understands:

- the methods of euthanasia suitable for a range of laboratory animal species;

legal restrictions or recommended guidelines for performing such methods; factors influencing the method of choice; confirmation of death.

Nutrition

Understands:

- how the nutritional requirements of laboratory animals can be met; the types and composition of laboratory animal diets.
- factors influencing the choice of diet and feeding practices; effects of specific treatments on nutritional content e.g. irradiation.

Monitoring, recording and reporting health status

Understands:

- common disease problems in a range of laboratory animal species; recognition of the signs of disease; zoonoses.
- the importance of disease prevention and control; the role of microbiological testing; implementation of health surveillance programmes.

Safety

Understands:

- the need for safe working practices; implementation of local protocols and national legislation controlling health and safety in the workplace.
- containment procedures for biological, chemical and other hazards; safe handling of equipment and supplies; personal hygiene; laboratory animal allergy.

Legislation

Demonstrates:

- a detailed working knowledge of national and other European legislation controlling the use of animals for scientific purposes; knowledge of other relevant legislation and national and international codes of practice.

Understands:

- the ethical implications of the use of animals for biomedical research.
- use of alternatives.

*Experimental procedures*Understands:

- the common routes for the administration of substances to experimental animals; factors influencing choice of route; preparation of dosing material; dosing volumes and frequency of dosing.
- the methods for removal and collection of body fluids; factors influencing choice of method; volumes and frequency of sampling.
- pre- and post-operative care; role and responsibilities of personnel involved; appropriate lines of communication.
- the principles of anaesthesia and analgesia; recognition of the signs of pain, discomfort and distress in the relevant species.

Teaching syllabus for Category A, Level 3

SUGGESTED MAIN TOPICS

*Management of the animal facility*Understands:

- management of the facility; effective use of resources; management of budgets; working relationships within and outside the department; implementation of procedures and policies for the efficient and safe operation of the animal facility; preparation of reports; use of computer-assisted management programmes.
- the principles of staff management; staff supervision, discipline, motivation and development, and assessment; recruitment and interviewing skills; training and education; assignment of work routines.

*Design of animal facilities*Understands:

- the role of the design team; planning and design of the facility to meet defined purposes; compliance with legal requirements; provision of services; financial controls.

*Breeding*Understands:

- the management of animal breeding colonies; production and maintenance of genetically defined and outbred strains; genetic monitoring procedures.

*Nutrition*Understands:

- the management of the nutritional requirements of laboratory animals in theoretical and practical terms; formulation and provision of special diets; implications of variation in dietary composition; quality assurance testing; factors influencing storage and use.

*Animal care/husbandry*Understands:

- the housing, maintenance and breeding of the more unusual laboratory animal species e.g. reptiles, amphibia.

*Environmental monitoring*Understands:

- management of the macro and micro environment; monitoring and recording equipment; interpretation of results; provision of back-up systems.

*Disease prevention and control*Understands:

- behavioural and clinical signs of ill health.
- pathology of common laboratory animal diseases.
- disease prevention, control and treatment; effects of disease and medications on interpretation of experimental results, breeding performance etc.; the effects of subclinical disease.
- the microbiological procedures associated with screening programmes; interpretation of results; factors affecting action taken; health monitoring schemes.

*Legislation*Has a working knowledge:

- of national and international acts, orders, regulations, schedules and codes of practice relevant to the management of an animal facility.

*Transportation*Has a working knowledge:

- of national and international regulatory requirements and documentation; hiring of official carrying agents; animal welfare issues.

*Anaesthesia and analgesia*Understands:

- the principles of anaesthesia management; choice and administration of anaesthetic agents; species peculiarities; anaesthetic and monitoring equipment.
- premedication; monitoring and maintenance procedures; anaesthetic emergencies; post-anaesthetic care.

*Surgery*Understands:

- the principles of surgery; aseptic technique; surgical instruments and their care; suturing materials and techniques; wound healing.
- pre- and post-operative care; complications and remedial action; recognition and control of infection and pain.
- principles of diagnostic and monitoring equipment e.g. radiography, endoscopy, ECG, EEG.

*Experimental design*Understands:

- the general principles for the design and conduct of experiments; experimental protocols; statistical control of experiments; record keeping.

*Animal welfare*Understands:

- practical aspects of normal and abnormal animal behaviour; assessment

of well-being, pain and distress; physiological, immunological, biochemical and behavioural aspects of stress; types of stressors.

- the role of environmental enrichment in animal welfare.

CATEGORY C—PERSONS RESPONSIBLE FOR DIRECTING ANIMAL EXPERIMENTS*

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After taking into account the reports of the European Communities Biologists Association (ECBA 1989) and the 2nd EC Workshop (EC 1989), it is concluded that scientists responsible for the design or conduct of animal experiments can be considered to be competent when they have fulfilled 2 requirements:

- completion of a full university degree course with attainment of a bachelor's or master's degree (depending on national custom) or the equivalent in a biomedical discipline such as (animal) biology, medicine or veterinary medicine;
- attendance at a basic course in laboratory animal science totalling not less than 80 h or the equivalent, whether taken as a block or as modules or the education and training accumulated by other acceptable means.

This basic study is intended to provide the foundation for responsible use of animals and achievement of high scientific

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standards, and should be completed before scientists are considered fully competent to undertake animal work on their own responsibility. Additional specialized training required for surgery, particular techniques and different species should be obtained through close collaboration with experienced investigators and animal technicians, or by attending specialized courses. Those who intend to go beyond skilled and competent use to become specialists in laboratory animal science, Category D, will be the subject of further recommendations at a later date. Those in Category D are likely to provide much of the additional specialized training mentioned above.

The requirement of Article 14 of the Directive that 'persons carrying out or supervising the conduct of experiments shall . . . be capable of handling and taking care of laboratory animals' should be met by knowledge of and appropriate proficiency in the topics listed in the 'Animal care/husbandry' section of the recommendations for Category A Level 1:

1. cleaning, feeding and watering of experimental, breeding and other animals;
2. competence in basic handling of the common laboratory animal species;
3. daily observation and inspection of animals for general condition (including noting food/water intake);
4. restricted methods of euthanasia following well-defined procedures;
5. general maintenance of animal rooms;
6. recording animal room environment and room procedures.

Summary of recommendations for Category C

- The minimum requirement for Category C persons should be a graduate education in a biomedical discipline to bachelor or master level plus a basic course totalling not less than 80 h or the equivalent in laboratory animal science.
- Eight main topics should be included in this basic study (detailed in the attached syllabus):

- a. biology and husbandry of laboratory animals;
- b. microbiology and disease;
- c. health hazards and safe practices in the animal house;
- d. design and conduct of animal experiments;
- e. anaesthesia, analgesia and experimental procedures;
- f. alternatives to animal use;
- g. ethical aspects and legislation;
- h. analysis of scientific literature.

- Those attending the course should be assessed at its conclusion, with an equivalent provision made for other modes of study.
- Provision should be made for additional specialized training.
- The appropriate authorities of the European Union and Council of Europe are recommended to consider the provision of guidance in accordance with these recommendations, and to consider forming a committee of experts to monitor such courses in Member States and to afford some form of accreditation where appropriate. FELASA offers its services to assist in this work, which should contribute to harmonization and to the training and mutual recognition of 'competent persons' in terms of the EU Directive and CoE Convention.
- FELASA is considering recruiting and training qualified instructors in laboratory animal science and compiling lists of experts, and may seek endorsement of its work from the EU and CoE.
- As there is a need for teaching materials, FELASA would wish to stimulate or guide the production of handbooks, databases, videotapes and interactive or other visual aids, and to collect information on established courses.

Teaching syllabus for Category C

SUGGESTED MAIN TOPICS

A. *Biology and husbandry of laboratory animals*

1. Introduction to laboratory animal science; use of animals for different

areas of research; history of animal experimentation.

2. Biology of laboratory animals (comparative anatomy, physiology); reproduction and breeding; care and housing; homeostasis and stress; animal well-being.
3. Ethology (behaviour) and environmental enrichment.
4. Handling and transportation of laboratory animals.
5. Nutrition; nutrient requirements; composition of diets; feeding practices; variation in diet composition and its impact on health status and experimental results; influence of additives on food acceptance; advantages and disadvantages of *ad libitum* feeding.
6. Genetic standardization; genotype–environment interactions; inbred strains; co-isogenic, congenic lines; transgenics; recombinant inbred strains; F₁ hybrids; random-bred and outbred stocks; genetic characterization; genetic quality control; cryopreservation.
7. Recognition, assessment and control of pain, suffering or distress.

B. Microbiology and disease

1. Health monitoring and prevention of disease; quarantine; hygiene; disinfection.
2. Gnotobiology; specified pathogen free (SPF) animals; germ-free animals; barrier units; isolators; laminar flow systems.
3. Diseases of laboratory animals; interactions of diseases with experiments; consequences of the use of drugs.
4. Safety in working with infectious animals.

C. Health hazards and safe practices in the animal house

1. Allergies, zoonoses, pathogens, carcinogens, radioactive materials, physical hazards etc.

D. Design and conduct of animal experiments

1. Preparation of the protocol of an animal experiment; literature search; choice of the experimental animal (species, strain, genetic standard, microbiological

standard); supply of animals and influence of transportation.

2. Animal models (spontaneous, induced); possibilities and limitations of animal experimentation; extrapolation of animal data to man.
3. Experimental design (e.g. factorial design, latin square); power analysis to calculate the number of animals in control and test groups; statistical analysis and interpretation of results.
4. Good Laboratory Practice (GLP).

E. Anaesthesia, analgesia and experimental procedures

1. Introduction to methods of anaesthesia; anaesthetics and analgesics; local analgesics and general anaesthetics.
2. Choice of anaesthetic agent in relation to animal species and nature of experiment; species-dependent variation in response to anaesthetics; effects of anaesthetics on experimental results.
3. Complications; post-experimental management of animals; safety and precautions.
4. Experimental procedures—demonstration and practice; non-surgical procedures such as injection, oral dosing, collection of blood, urine or faeces; principles of surgery, surgical equipment, aseptic techniques, demonstration of some surgical procedures.
5. Euthanasia; chemical methods and physical methods; disposal of carcasses.

F. Alternatives to animal use

1. Defining alternatives; refinement, replacement or reduction of animal use; survey of alternatives; possibilities and limitations of alternatives; alternatives in education and research.

G. Ethical aspects and legislation

1. Attitudes towards animals; man–animal relationships; intrinsic and instrumental value of animals; arguments for and against the use of animals for scientific purposes; discussion of the ethical aspects of animal use; ethics committees.

2. Legal aspects; survey of national and European legislation respecting animal use for scientific purposes; licensing; competent persons; inspection; registration.

H. Analysis of scientific literature

1. Analysis of published work, scrutiny of choice of animal species or strain, number and specification of animals used, design of experiment, surgical or other experimental procedures, consideration of the justification of the work reported.

THE COURSE SHOULD BE CONCLUDED BY AN EXAMINATION OR OTHER FORM OF ASSESSMENT.

References

- ECBA (1989) *Competence of biologists for experiments on animals*. Report of the Workshop organized by the European Communities Biologists Association at Amsterdam, The Netherlands, March 7-9, 1988 (van Emden HM, de Cock Buning T, Lopes da Silva FH, eds). ECBA publication no. 8. ISBN 90-6984-029-4
- EC (1989) *Animal experimentation: legislation and education*. Proceedings of the EC Workshop in Bilthoven, the Netherlands, May 22-24, 1989 (van Zutphen LFM, Rozemond H, Beynen AC, eds). Rijswijk: Veterinary Public Health Inspectorate, and Utrecht: Department of Laboratory Animal Science. ISBN 90-9002946-X

Note: reprints of this report are available free of charge from the Secretary, FELASA, BP 0109, 69592 l'Arbresle Cédex, France.