

Invited International Perspective

Education and Training for the Care and Use of Laboratory Animals: An Overview of Current Practices

Bert van Zutphen

Key Words: competence; education; harmonization; laboratory animal science; legislation

The quality of research and the welfare of laboratory animals greatly depend on the competence of personnel involved in the care and use of the animals. Before 1985 both in the United States and in Europe, training programs were already available for veterinarians and animal technicians, but teaching scientists on the principles of laboratory animal science was still a rather uncommon phenomenon. In 1985, the US Congress enacted two laws containing provisions on the care and use of animals in research, testing, and education: the Food Security Act (AWA 1985), which amended the Animal Welfare Act of 1966, and the Health Research Extension Act (PL 99-158 1985), which revised the Public Health Service (PHS¹) Act (PHS 1999) and requires compliance with the *Public Health Service Policy on Humane Care and Use of Laboratory Animals* (PHS 2002) for all animal research supported by PHS funds. Both laws contain requirements on competence: institutions must provide training so that all persons with responsibilities for the use and care of laboratory animals are qualified for their job. This also includes researchers and members of institutional animal care and use committees (IACUCs¹).

In Europe, the *Directive 86/609/EEC on the Protection of Animals used for Experimental and other Scientific Purposes* (EU Directive¹) (Anon 1986) was adopted by the European Parliament in 1986, whereas in the same year the Council of Europe (CoE¹) adopted the *Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Procedures* (ETS123 1986). Both the EU Directive and ETS123 contain provisions on compe-

tence for persons involved in animal experimentation. The provisions of the EU Directive must be implemented into national legislation by all 25 European Union (EU¹) Member States, whereas implementation of ETS123 is not mandatory for the 48 Member States of the CoE unless the Member State has ratified the convention. Also in Canada, New Zealand, and several other countries, guidelines have been developed to meet the requirements on competence.

At present, there are many examples of excellent programs in the format of classes, hands-on workshops, and interactive computer-based tutorials. Also the quality and quantity of teaching material is impressive. The availability of education and training programs is providing a sound basis for a responsible use of animals in research. In this context, “education” refers to the didactic presentation of information and theories of animal use that will contribute to the development of proper attitudes toward the use of animals in scientific procedures (including respect for animals), whereas “training” refers to the acquisition of practical knowledge and skill needed for animal handling and the proper conduct of animal experiments (Zurlo et al. 1996). Further improvement of the situation can be achieved through harmonizing of the requirements. At present there are still major differences between countries, and between institutions in these countries, regarding the programs that must be taken in order to comply with the requirements. These differences are mainly due to the fact that none of the present legislative regulations is specific on the length and/or depth of the teaching program for each of the categories.

In Europe, legal requirements on competence are mainly based on Article 14 of the EU Directive (Anon 1986), which states that “persons who carry out experiments or take part in them and persons who take care of animals used for experiments, including duties of a supervisory nature, shall have appropriate education and training. In particular, persons carrying out or supervising the conduct of experiments shall have received instruction in a scientific discipline relevant to the experimental work being undertaken and be capable of handling and taking care of laboratory animals; they shall also have satisfied the authority that they have attained a level of training sufficient for carrying out their tasks.” Up until now, the EU has not further specified the

Bert van Zutphen, Ph.D., is Emeritus Professor at Utrecht University, Utrecht, The Netherlands.

¹Abbreviations used in this manuscript: CoE, Council of Europe; ESF, European Science Foundation; EU, European Union; EU Directive, *Directive 86/609/EEC on the Protection of Animals used for Experimental and other Scientific Purposes*; FELASA, Federation of European Laboratory Animal Science Associations; IACUC, institutional animal care and use committee; PHS, US Public Health Service.

requirements for education and training. However, both the CoE and the Federation of European Laboratory Animal Science Associations (FELASA¹) have formulated more specific guidelines for different categories of personnel. As an example, for the investigator who is responsible for the design and performance of animal experiments, the minimum standard of competence should be based on a graduate study at the level of M.Sc. in one of the biomedical disciplines and a course on laboratory animal science of at least 80 hr (CoE 1993; FELASA 1995). The contents of the course should include topics like biology and husbandry of laboratory animals, gnotobiology and diseases, design of animal experiments, experimental techniques, anesthesia and analgesia, alternatives, and ethical aspects. The European Science Foundation (ESF¹), a nongovernmental association of 78 leading science organizations from 30 European countries, is fully supporting this content and has stated it is essential that, when organizing a course on laboratory animal science, this should also include information on animal alternatives, welfare, and ethics (ESF 2001).

Nevertheless, despite the guidelines of CoE and FELASA and the recommendations of ESF, specific requirements still differ between countries. Although most countries do require an academic degree in biology, medicine, or veterinary medicine, in some countries (e.g., the UK, Portugal, Ireland, and Denmark), the degree is not specified. In addition, the recommended basic course in laboratory animal science of at least 80 hr has not been implemented in all EU Member States. In some countries such as Sweden, Denmark, Finland, France, The Netherlands, Belgium, and the UK, a course has been made mandatory by law, but the length of the course varies (40–120 hr). In other countries such as Spain, Germany, Italy, and Portugal, courses are organized at several universities, but such a course has not been made mandatory by law. Harmonization—based on a standardized set of (minimum) requirements—seems important, not only because the diversity that presently exists hampers the free exchange of scientists between Member States, but also because such harmonization will have a positive effect on the welfare of animals, especially in those countries where formal requirements have not yet been clearly formulated or implemented. Presently, the EU Directive 86/609 is in the process of revision, thus providing an excellent opportunity to address this problem.

In The Netherlands, ample experience exists regarding the education and training of scientists. In 1985, a course on laboratory animal science was made compulsory. According to the Dutch law, all scientists who intend to perform experiments that (may) involve the use of live animals must have completed a graduate study in one of the biomedical disciplines and, in addition, must have taken a course in laboratory animal science. This is an intensive 2-wk course covering not only most topics of laboratory animal science, including animal husbandry, genetic and microbiological standardization, animal models, design of animal experiments, experimental techniques, pain assessment, and pain

control, but also topics on animal welfare, animal alternatives, and ethics. Crucial parts of the course are the critical analysis of scientific papers and the design and defense of a protocol on an animal experiment. The implication is that this course cannot be organized as a web-based tutorial. The interaction of students with teachers and fellow students is considered a prerequisite for the quality of this course and has proven to be a powerful tool for the development of a responsible attitude toward animals in research. The course is presently organized at seven universities and is centrally coordinated by the Utrecht Chair on laboratory animal science. All scientists graduated after 1985 who have worked for some time with animals in research have completed such a course. Since 1993, an English version of the course has also been offered for foreign students and scientists. Students' evaluations have indicated that the course has a positive influence on their attitude toward animals, improves their confidence, and is considered essential for the quality of their research. These courses consistently receive a high ranking in the evaluation.²

In the United States, the regulations that implement the Animal Welfare Act specifically require that institutions provide training in the following areas: humane methods of animal maintenance and experimentation; the availability and use of methods that limit the use of animals or minimize animal distress; the proper use of anesthetics, analgesics, and tranquilizers; and methods whereby deficiencies in animal care and treatment are reported. The provisions on competence as formulated in the Animal Welfare Act (AWA 1996) and in the *Public Health Service Policy on Humane Care and Use of Laboratory Animals* (PHS 2002) have had a major impact on the development of teaching programs for investigators, members of IACUCs (no guidelines for this category exist in Europe), and students. Most institutions using animals in research have developed such teaching programs, and the IACUC often plays a central role in the design and implementation of these programs. However, despite the publication by the National Research Council of *Education and Training in the Care and Use of Laboratory Animals: A Guide for Developing Institutional Programs* (NRC 1991), there still are, as in Europe, major differences between institutions on the length and contents of these programs. As an example, the IACUC of the University of Maine requires that all faculty, staff, and students involved with the use of vertebrate animals complete the Institutional Animal Care and Use Training Program. The training program is a web-based tutorial that takes approximately 1 hr to complete. According to the Committee, the course is in compliance with the federal regulations (http://orspdocs.umesp.maine.edu/Ethical/training_policy_web.htm). A more comprehensive program is offered by the University of Tennessee Health Science Center in Memphis, Tennes-

²Editors' Note: Readers are referred to the second edition of the author's coedited book titled *Principles of Laboratory Animal Science: A Contribution to the Humane Use and Care of Animals and to the Quality of Experimental Results* (Van Zutphen et al. 2001).

see. The university has prepared a handbook for self-instructional training and provides several seminars in order to assist investigators and other personnel in fulfilling the training requirements. A two-credit graduate course, Essentials of Animal Experimentation, is offered annually for graduate students and technicians. Lectures are complemented by laboratory sessions that enable students to obtain 'hands-on' training in basic procedures involving laboratory animals. The university also offers an advanced graduate course in the biology and pathophysiology of laboratory animals (<http://www.utm.edu/compmed/Considerations.html>).

It is obvious that major differences in teaching programs and requirements on competence exist, both in the United States and in Europe. To a certain extent such differences can have a rational basis, particularly when the research profiles of institutes are different. However, it seems that whatever the research profile of the institute may be, there are quite a number of basic elements that should be taught to every investigator before such a person can be granted the responsibility for the design and performance of an animal experiment. In this issue of *ILAR Journal*, this topic is profoundly elaborated in two articles, one by Karen Hrapkiewicz et al. (2007) and the other by Stacey L. Conarello and Mary Jo Shepherd (2007). As stated by the issue editors, Leticia V. Medina and Lynn C. Anderson, teaching programs should ensure optimal animal care and use, but should also provide assurance to the public that animal research is conducted responsibly. It is unlikely that the basic elements needed to fulfill these objectives can be taught through a 1- to 2-hr web-based tutorial. The International Council for Laboratory Animal Science (ICLAS) is recognizing the need for harmonization. A subcommittee of the Working Group on Harmonization examines general principles for training to create an international reference document with the goal of harmonizing such training. Some legal guidance might prove to be needed in the process of harmonizing the basic (minimum) requirements on education and training.

References

Anon 1986. Directive 86/609/EEC of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Mem-

- ber States regarding the protection of animals used for experimental and other scientific purposes. Off J Eur Communities L358:1-29.
- AWA [Animal Welfare Act]. 1985. Food Security Act of 1985—Animal Welfare. Also called The Improved Standards for Laboratory Animals Act, enacted December 23, 1985. Public Law 99-185. Washington DC: GPO Office of the Federal Register.
- AWA [Animal Welfare Act as Amended (7 USC, 2131, 2156)]. 1996. The complete Animal Welfare Act including all amendments (1970, 1976, 1985, 1990) following the 1966 enactment. This version is current through 1996 and can be found in United States Code, Title 7, Sections 2131 to 2156.
- CoE [Council of Europe]. 1993. Resolution on education and training of persons working with laboratory animals adopted by the Multilateral Consultation on 3 December 1993. Available online (http://www.coe.int/t/e/legal_affairs/legal_co%2Doperation/biological_safety%2C_use_of_animals/laboratory_animals/Res%20training.asp#TopOfPage).
- Conarello SL, Shepherd MJ. 2007. Training for research investigators and technicians. *ILAR J* 48:000-000.
- ESF [European Science Foundation]. 2001. Use of animals in research. ESF Policy Briefing 15, 1-6.
- ETS123. 1986. European convention for the protection of vertebrate animals used for experimental and other scientific purposes. Available online (<http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=123&CM=8&DF=9/5/2006&CL=ENG>).
- FELASA [Federation of European Laboratory Animal Science Associations]. 1995. 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* 29:121-131.
- Hrapkiewicz KL, Tear M, Medina LV, Anderson LC. 2007. What should basic orientation training include? *ILAR J* 48:120-130.
- NRC [National Research Council]. 1991. Education and Training in the Care and Use of Laboratory Animals. Washington DC: National Academy Press.
- PHS [Public Health Service]. 1999. Public Health Service Act. United States Code, Title 42—The Public Health and Welfare. Washington DC. US Department of Agriculture.
- PHS [Public Health Service]. 2002. Public Health Service Policy on Humane Care and Use of Laboratory Animals. Washington DC: US Department of Health and Human Services.
- PL [Public Law] 99-158. 1985. Health Research Extension Act of 1985. November 20, 1985, Animals in Research. Washington DC: GPO.
- van Zutphen LFM, Baumans V, Beynen AC. 2001. Principles of Laboratory Animal Science: A Contribution to the Humane Use and Care of Animals and to the Quality of Experimental Results. 2nd revised ed. Amsterdam: Elsevier.
- Zurlo J, Rudacille D, Goldberg AM. 1996. The three Rs: The way forward. *Envir Health Perspect* 104:878-879.