

# Approaches to Teaching Animal Welfare at 13 Veterinary Schools Worldwide

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## ABSTRACT

This paper comprises brief descriptions by faculty at 13 veterinary schools in Europe, North America, South America, and Australasia that summarize undergraduate training in animal welfare at the respective schools and how students are assessed.

## INTRODUCTION

In this article faculty from 13 veterinary schools in Europe, North America, South America, and Australasia summarize how animal welfare is taught to students at their respective schools and how those students are assessed. Three other articles in this issue describe the teaching of animal welfare at the University of Sydney, Australia;<sup>1</sup> at the Ontario Veterinary College, Canada;<sup>2</sup> and in the UK.<sup>3</sup> A fourth article outlines a course in animal welfare and ethics developed for veterinary schools by the World Society for the Protection of Animals.<sup>4</sup>

The courses described here concern animal welfare in a broader sense than health and production alone. By virtue of being part of the respective schools' programs, training in animal welfare is mandatory for graduation in all of these schools. However, the curricular requirements are more extensive in some schools than in others, often reflecting variations in the requirements of licensing bodies in different regions. Table 1 provides a comparison of the approaches taken at the different schools. Formal training in pain management is not part of the animal welfare courses described here, being provided in other courses such as anesthesia and pharmacology.

## UNIVERSITY OF VETERINARY MEDICINE VIENNA, AUSTRIA (DANIELA LEXER)

The University of Veterinary Medicine Vienna is the only Austrian institution that provides academic education in veterinary sciences. At present, two veterinary curricula are in force. This article describes the newest one, a six-year curriculum established in 2002. Approximately 300 students begin the program each year, but the dropout rate is high. Until 1996, training in animal welfare was optional and the courses concerned (ethology, clinical ethology, ethics and husbandry) did not provide practical training. In 1996 the Institute of Animal Husbandry and Animal Welfare (IAHAW) was established. Since then, education in animal welfare has been covered in several courses throughout the program and includes site visits.

Some of the animal welfare courses are taught exclusively by the IAHAW or in collaboration with other institutes or clinics. During the first year, students receive obligatory training in animal welfare in two courses: Animal Husbandry and Ethology, and Ethics. In the third year,

an obligatory course, Farm Animal Husbandry and Farm Animal Welfare, also covers animal welfare and includes a farm visit specifically addressing welfare issues. Students also have to attend a course (lectures and practical training) in Animal Behavior and Animal Handling, which focuses exclusively on horses, cattle, and pigs. From the fifth year on, students may specialize, and aspects of animal welfare are covered in the appropriate obligatory courses: Behavior Problems and Therapy in Cats and Dogs; Husbandry and Care of Rodents; Animal Husbandry and Animal Welfare (Farm Animals); Animal Husbandry and Animal Welfare (Birds and Reptiles); and Basics of Up-to-Date Husbandry in Zoos and Protection of Species.

In addition, throughout the program, students must select from various optional courses, including the following which have significant animal welfare content: Ethology of Farm Animals (including an excursion to farms); General Ethology; Ethics in Animal Welfare and Human-Animal Interaction; Animal Welfare Issues in Farm Animals; Diseases Caused by Husbandry Systems; and Farm Animal Husbandry in Organic Agriculture, which includes visits to different farms. Students have also the option to participate in one week of practical training in Methods of Behavioral Studies in Farm Animals or one month of practical training at the IAHAW.

The primary teaching goal for the animal welfare component of these courses is to give students knowledge and enable them to be advocates for animal welfare in practical situations. Special efforts are made to help students understand that concern for animal welfare in a broader sense than health can make a substantial contribution to disease prevention. Students are acquainted with standard and alternative husbandry systems; they are taught about normal behavior, possible behavioral problems, the needs of the animal, and how to handle the animal in a proper way. They learn how to detect injuries and diseases caused by husbandry systems and are taught about different methods of assessing animal welfare. Students are also introduced to the fields of human-animal interaction and ethics in animal welfare. Animal welfare issues during transport, slaughter, and in the context of mutilations are further topics.

The IAHAW attempts to diversify the courses by inviting guest lecturers from different disciplines where appropriate,

**Table 1: Features of instruction in animal welfare—in aspects other than health alone—in veterinary training programs at 13 schools**

<b>Institution</b>	<b>Animal Welfare Is a Course in Its Own Right</b>	<b>Duration of Veterinary Program (Years)</b>	<b>Years in which Welfare Is Taught</b>	<b>Methods of Student Assessment</b>
University of Veterinary Medicine Vienna, Austria	No	6	Years 1 and 3: obligatory Years 5 and 6: obligatory and optional courses	Years 1 and 3: written exam; short-answer and multiple-choice questions (Year 1) Year 3: written exam Years 5 and 6: oral exam
Ghent University, Belgium	Yes	6	Years 1 and 6: obligatory	Year 1: written exam Year 6: written exam
Universidade Federal do Paraná, Brazil	Yes	5	Year 5: optional	Written exam (7 points) + student presentations; field reports; participation in class; and journal club (3 points)
Western College of Veterinary Medicine, Canada	No	4	Years 1–3: as part of other obligatory courses	Year 1: part of written exam and written assignment specific to animal welfare Year 2: part of written exam and oral debates Year 3: discussion only, no exam
University of Veterinary and Pharmaceutical Sciences Brno, Czech Republic	No	6	Years 2 and 3: as part of other obligatory courses	Multiple-choice exams, presentations, and projects Year 2: oral exam; class participation Year 3: oral exams; class participation; case analyses
Faculty of Veterinary Medicine, University of Helsinki, Finland	Yes	6	Year 2 From Year 3 on, students can take an optional welfare course. Also, welfare theme is integrated throughout all years.	Year 2: written exam with short essays Year 4–6: discussion during free or structured debates on lectures or by the patient; written exams on animal welfare law
University College Dublin, Ireland	Yes	5	Year 2: obligatory	Written exam with short- and long-answer questions; practical written exam (students analyze a case study); oral exam
Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, Mexico	Yes	5	Year 1 and 2: obligatory	Year 1: student presentations; written exam with short-answer and multiple-choice questions; five short practical assignments Year 2: written exam with short-answer and multiple-choice questions
Massey University, New Zealand	Yes	5	All years: obligatory	Written examination; assignment (essay); practical examinations
University of Cambridge, UK	Yes	6	Year 4, with some material covered in Year 1. Obligatory.	End-of-year examination

(continued)

**Table 1: Continued**

Institution	Animal Welfare Is a Course in Its Own Right	Duration of Veterinary Program (Years)	Years in which Welfare Is Taught	Methods of Student Assessment
Royal (Dick) School of Veterinary Studies, University of Edinburgh, UK	No	5	All years: obligatory	Years 1 to 4: assessed as normal part of veterinary teaching using written examinations (essays; short-answer questions, multiple-choice); practicals; extramural experience reports Year 5: rotations assessed using written reports and clinical performance
School of Veterinary Medicine, University of Pennsylvania, USA	No	4	Year 3: one obligatory and two elective courses	Student presentations; written exams with long- and short-answer questions
Cummings School of Veterinary Medicine, Tufts University, USA	No	4	All years: obligatory	Years 1 and 3: written exams of varying format Years 2-4: observation and coaching regarding practical techniques

as, for instance, in ethics, or by assigning small-group work in which students deal with specific topics with a subsequent presentation and discussion. Excursions and practical training are essential, but these have been limited recently by budget cuts. Students' knowledge is assessed through written or oral exams. An alternative means of assessing students' proficiency in animal welfare could be the elaboration of several case studies dealing with different issues in animal welfare, as well as a practical examination in assessing different husbandry systems with regard to animal welfare.

While coverage of animal welfare in the curriculum is quite extensive, the lecture content is dominated by farm animal welfare. There is a need to improve training in animal welfare in small animals in general and especially in exotic animals. For instance, the veterinarian should know about possible animal welfare issues in pet shops or in shelters. Horses are partly dealt with in lectures on farm animals; during the specialization phase of the curriculum, however, a course focusing on equine welfare should be obligatory. Pain management and animal welfare legislation are dealt with as part of other courses, but, as these two subjects are important factors in animal welfare education, an obligatory course in pain management as well as a course in animal welfare legislation in its own right should be offered.

**FACULTY OF VETERINARY MEDICINE, GHENT UNIVERSITY, BELGIUM (FRANK O. ÖDBERG)**

At Ghent University, there is no specific veterinary course on animal welfare, and the topic is mainly embedded within the ethology course. Physical aspects of welfare are dealt with in various clinical courses. Ethology has been taught to veterinary students to various degrees since the 1970s. It was reduced to 10 hours, but currently 30 hours of lectures are given in a first-year course called Ethology, Ethics, and Welfare. The main part (about 22 hours) consists of an introduction to ethology. Whenever possible, examples are used concerning domestic animals, with associated ethical reflection. About three hours are dedicated to the most important concepts used in bioethics and to explaining how a possible welfare problem may be dealt with within a given sociocultural context: from the current zeitgeist, through scientific evaluation and advising councils and committees, to the final political decision. Finally, a short survey of the normal ethogram of the horse, the dog, and the cat is given during about five hours. No practical work or tutorials are provided owing to the large class size (350-400 students), low staff numbers, and the university's limit on the maximum allowed study points per year. Students' proficiency in welfare is assessed by means of a final written exam.

In the sixth and last year of the veterinary program students specialize in one of the following five areas: ruminants, swine/poultry, horses, small animals (i.e. mostly cats/dogs), and research. In the first four tracks a course is given that combines four topics: breeding management, nutrition, housing (not for small animals), and ethology. In this course, four to six lecture hours are spent on behavioral and welfare problems of ruminants, swine, and poultry. In the case of horses, there are four and a half theory hours with six hours of practical work in which the correct schooling of horses is explained and demonstrated. The theory of treating behavioral problems in dogs and cats

is explained over the course of nine hours of tuition. A further six hours are dedicated to role-playing so that students learn how to organize a behavioral consultation. Every year, during a three-hour session, an external expert with practical experience explains and demonstrates how dogs are trained. Students from the companion animal track are also required to attend the behavioral clinic in small groups for a half a day every week.

The few students who follow the research track do not take a compulsory welfare course. However, most do take the two-week Federation of European Laboratory Animal Associations (FELASA) course on laboratory animal science (100 hours, given in English), which is designed for people who supervise research with animals. The course includes behavior and welfare (3 hours), enrichment (1.5 hours), and ethics (1.5 hours), all of which deal directly with animal welfare. Other topics such as housing, handling, and alternative research techniques also include welfare aspects implicitly. There is also a two-year FELASA course, aimed at specialists who will run laboratory animal facilities, that includes an optional advanced course in ethology and animal welfare (25 hours of theory and 10 hours of practical work). The smaller number of students permits tutorials in which explanations of the behavior of laboratory species are examined and publications are analyzed. Students also write an essay on a given subject. Continuing education lectures about the welfare problems of farm, companion, and exotic animals are being considered because there is an increasing need for veterinary inspectors from the civil service to also be knowledgeable in animal welfare.

Although good health contributes to welfare in the broad sense, the concept of welfare developed separately from health concerns. Ethologists have long had to fight against those who considered that a well-fed and healthy animal is a happy one while forgetting that it also has a brain. The result of this contest has been the recognition of welfare in terms of "behavioral needs" and the stress induced by inadequate management and stockmanship. Thus, most international committees differentiate between welfare and health. Welfare should be restricted to the study and relief of negative consequences caused by specific ways in which animals are kept and used. Moreover, after a scientific analysis of a given welfare problem, the final decision is ethical, as it should take different interests into account. Thus, welfare overlaps not only with ethology but also with ethics. Ideally, a course about welfare should be twinned with a full one on ethics. However, there is no time to provide for this in the curriculum, except, to a small degree, in the course on laboratory animal science.

Veterinary students at the University of Ghent receive didactic training and some practical training in animal welfare and ethology. Education in these areas would be improved by a shorter gap between the basic course and the species-specific courses, smaller class sizes, and more time for lectures and practical work. In the case of the final-year course, the limited time available for each component is far from satisfactory because, in most years, there is not enough calendar time available for the officially required lectures or for tutorials. Improvements are necessary if the veterinary profession is to have well-informed members who are able to think independently and show leadership in animal welfare.

## **FEDERAL UNIVERSITY OF PARANÁ, BRAZIL (CARLA FORTE MAIOLINO MOLENTO)**

Starting in 2006, animal welfare will be taught as an optional stand-alone course during the fourth and fifth years of the five-year program at the Federal University of Paraná. There is already strong student interest in the course, the ultimate goal of which is to improve the quality of life of all animals. By teaching future veterinarians basic concepts in animal welfare, the university hopes to ensure that their professional activities will include the assessment of animals' welfare state, followed by economically and socially viable actions to improve it. Throughout the course, a principal objective is to motivate the student to use science and creativity to develop feasible steps that can be adopted to improve animal welfare.

The course is divided into sections. The first section covers the history of animal welfare as an independent science; an introduction to the scientific concept of animal welfare and related issues; and a discussion of the importance of animal welfare to the veterinary profession. Aspects of human-animal interaction are then covered, starting with a historical review of thinkers from René Descartes to Peter Singer, and culminating in a review of the available information on attitudes to animals in Brazil. The ethics of animal welfare and the interrelationship with other ethical concepts are discussed.

A more applied section, which constitutes the major part of the course, is divided into the assessment of animal welfare and discussion of welfare issues pertinent to different animal groups. The main forms of animal welfare evaluation, including physiological and ethological indicators of welfare and the concept of the Five Freedoms,<sup>5</sup> are presented. Subsequently, welfare specifics are taught in relation to animals grouped in the following human-animal interaction categories: farm animals, companion animals, animals in entertainment, laboratory animals, and wild animals. The lecture on companion animals includes a detailed discussion of stray animals and modern alternatives for controlling urban cat and dog populations. Principles relating to euthanasia and humane slaughter are introduced. A section on animal law examines the history of regulations in Europe and Brazil, including current legislation. Future national and international trends, including possible trade aspects of animal welfare, are then presented. The economics of animal welfare are discussed in detail, with special focus on farm animals. Here the distinction is made between areas where improvements in welfare result in economic gain and those where further improvement results in reduced profit to the producer. This distinction introduces the possibility of animal welfare adding value to animal products. The welfare potential of the most common production systems in Brazil is discussed. Students are supervised in choosing and preparing material to present in class. Their presentations are followed by class discussion, with the goal that students learn to articulate well-reasoned arguments about animal welfare.

Most sections of the course are taught through lectures and student activities. The activities vary from fieldwork (such as farm, slaughterhouse, and shelter visits), to literature searches, to in-class exercises such as role playing. An important exercise is students' application of questionnaires

to the local population to collect information about many different aspects of society's attitudes to animal issues, which are then discussed in class. Student performance in these activities is evaluated continually in the following ways: their assessment of animals' welfare under different circumstances; their seminar presentations; their engagement in class discussions; and their selection and presentation of scientific work on animal welfare. All these activities contribute to the students' final grades. At the end of the course, a written exam is the major component of the assessment of students' proficiency in animal welfare.

There are a number of high-priority areas for animal welfare teaching in Brazil. First, it is imperative to instill in future veterinarians a concept of welfare that will allow a scientific approach to assessing welfare in a variety of situations. In order to achieve this, the scientific definition of animal welfare is emphasized in the current course, based on the concept by Broom.<sup>6</sup> The reason for this emphasis is that, in Brazil, many students and veterinarians<sup>7</sup> hold a highly subjective perception of animal welfare that is not operational. It is especially relevant to clarify the distinction between animal welfare and ethics and to show how to assess welfare independently of ethical considerations, and then incorporate this knowledge into ethical decisions.

The second point is that experience in Brazilian veterinary schools reveals some resistance among other professors to animal welfare teaching. As colleagues perceive the animal welfare professor as a collaborator, however, the situation improves rapidly in most cases. This has in turn allowed the development of partnerships that enhance the teaching of animal welfare as a viable and applied science and has broadened the spectrum of educational activities that include animal welfare considerations.

Finally, although the course is intended to cover the welfare of animals in most common human-animal interactions, it is especially relevant to provide detailed coverage of the welfare of farm animals because of the importance of animal agriculture in Brazil. Moreover, it is crucial to study in detail the economy of animal welfare. In order to achieve this goal, the basic concepts reported by McInerney<sup>8</sup> are included in the animal welfare course taught at the Universidade Federal do Paraná, with comments concerning the Brazilian context.

#### **WESTERN COLLEGE OF VETERINARY MEDICINE, SASKATCHEWAN, CANADA (JOSEPH M. STOOKEY)**

Animal welfare is not offered as a stand-alone course at the Western College of Veterinary Medicine (WCVN). However, the subject is addressed throughout the four-year program, as a number of courses include instruction in and discussions about pain management, animal welfare, animal behavior, and the human-animal bond. A total of 65 contact hours is dedicated specifically to these topics, excluding the hours that may be used to discuss welfare issues during clinical rotations in the fourth year.

Welfare training begins in the first year of the program. In a herd management course, first-year students are required to read and know the Animal Welfare Position Statements of the Canadian Veterinary Medical Association (CVMA)<sup>9</sup> and are tested on this material. During this course,

students participate in livestock handling and restraint labs, which emphasize safety for both animals and people but also emphasize the importance of low-stress handling for the animals. The labs also introduce students to the tools and equipment used to perform routine procedures such as dehorning, castration, and tail docking. One lab includes a dehorning demonstration. The equipment and the dehorning procedure are presented with the intent of stimulating discussion on the issue of pain mitigation. Students are made aware of welfare-friendly alternatives and encouraged to take an active role, following graduation, in educating their clients on the importance of pain management.

First-year students also produce a written response to a hypothetical case of their choosing, in which they are asked by a producer or owner to perform a routine procedure (castration, dehorning, branding, teeth clipping, tail docking, beak trimming, etc.). The student must select the tool(s) and technique he or she would, as a veterinarian, use to perform this procedure. Students have three available options in this assignment: to choose not to perform the procedure; to perform the procedure without analgesics; or to perform it with analgesics. They must defend their decisions by addressing their responses to the parties most likely to be opposed to their choices: the producer, the owner, or society as a whole. In their first year, students also receive two formal lectures on the history and importance of animal welfare and the role of veterinarians in addressing welfare issues.

During their second year, students in a multi-species herd management course are presented with animal welfare issues such as health, confinement housing, rearing systems, transportation, slaughter, and routine painful procedures for each species. Two sections of the course include formal debates in which students argue contentious issues such as antler removal, tail docking in dairy cows, or mass culling of animals to control the spread of diseases. The debates are intended to bring students up to date on scientific knowledge, ethics, and acceptable standards in dealing with welfare issues.

All third-year students participate in a professional issues course where ethical and animal welfare cases are presented. Topics such as convenience euthanasia, downer animals, cosmetic surgery, and debarking are presented as simulated cases and are discussed in an open forum. Students are reminded of the CVMA's position statements<sup>9</sup> and asked to reflect upon their likely response to situations they may confront in practice. These particular discussions are designed to help students appreciate the complexities, the options, and the ethical issues surrounding contentious animal welfare issues. Third-year students are also enrolled in surgery and anesthesia courses where pain management is emphasized. In a pathology course, the students are given a laboratory exercise and assignment on lab animals designed specifically to educate them on evaluating pain, distress, sickness, and setting humane endpoints to limit pain and distress. A pharmacology course covers the wide array and use of compounds for mitigating pain.

During their fourth year, students select rotations to match their interest, many of which re-emphasize lessons taught in the pre-clinical years. Discussion during small animal surgery again includes spaying, neutering, tail docking,

ear cropping, declawing, and debarking and reintroduces the relevant CVMA Animal Welfare Position Statements.<sup>9</sup> Internal medicine and field service rotations often give students opportunities to perform routine procedures and practice applying the appropriate pain blocks.

Several non-curricular activities provide students with opportunities to further their understanding of animal welfare issues. Over the years many noted philosophers and scientists from around the world, and specialists in animal welfare, have been invited to address WCVM faculty, staff, and students.<sup>10</sup> These lectures take place annually and are funded and organized through the college's visiting scientist and visiting lecturer program. Since 2003, the WCVM has had an animal welfare club, organized and run by the student body, whose sole purpose is to enhance student awareness of animal welfare issues. The club meets weekly to discuss ethical/animal welfare cases and to organize events. A member of the club currently sits on the Animal Welfare Committee of the Saskatchewan Veterinary Medical Association, while a student at large serves on the college's Animal Care Committee. In addition, the Farm Animal Council of Saskatchewan<sup>11</sup> provides up to eight \$1,000 scholarships to WCVM students. The council set up the scholarships with the sole intention of raising animal welfare awareness among the students, veterinarians, producers, and the general public.

The WCVM Interprovincial Undergraduate Summer Student Research Program is another way in which students can be exposed to animal welfare science and issues. Successful applicants receive funding to work with an advisor and participate in new or ongoing research projects. Numerous faculty advisors, including anesthesiologists, surgeons, theriogenologists, behaviorists, production specialists, and pharmacologists, have undertaken projects that directly or indirectly investigate animal welfare issues. In a similar vein, several students have been recipients of the Frontiers for Veterinary Medicine research award made available through the Geraldine R. Dodge Animal Welfare program.<sup>12</sup>

While a formal course in animal welfare at the WCVM might have merit, animal welfare is already present throughout the curriculum and the student experience. As long as faculty are dedicated to the topic of animal welfare, we can be assured that students will be exposed to the philosophy, ethics, and the science of animal welfare during their program here.

#### **UNIVERSITY OF VETERINARY AND PHARMACEUTICAL SCIENCES BRNO, CZECH REPUBLIC (EVA BARANYIOVÁ)**

In the former Czechoslovakia, animal behavior, husbandry, and the protection of animals had deep roots in the veterinary profession.<sup>13</sup> At the University of Veterinary and Pharmaceutical Sciences, established in Brno in 1918, the importance of animal behavior for veterinary students was stressed. Animal psychology was part of the curriculum from 1927, which was unusual for veterinary schools. Aspects of animal welfare were included from 1954 in a course on animal hygiene and from the 1990s in several other disciplines. Currently, animal welfare is covered in two core courses and one elective, as outlined below. These provide a good basis from which students can apply their

knowledge of welfare during clinical courses. Furthermore, undergraduate and post-graduate students participate in research projects relating to welfare issues (e.g., evaluation of dog shelters; pet ownership studies; and evaluation of slaughter and transport of farm animals).

In the second year of study, a joint core course in Animal Protection and Animal Behavior is taught; it consists of 15 hours of lectures and 30 hours of practical work. Students learn the principles of the ethology of farm and companion animal species, including problem behaviors in farm animals and their management, thus also addressing ethical and welfare issues. Guest lectures are given by animal behaviorists from abroad (three hours in 2002; four hours in 2003). Students are also taught about the history, importance, and nature of animal protection, including the relevant legislation, which has been harmonized with that of the European Union. Practical work covers examples of legal observance and legal violations and the measures to be taken in the latter case. This training is based on the Program of Animal Welfare Protection prepared and implemented by the State Veterinary Administration of the Czech Republic since 1993.

The main core course dealing with animal welfare is that of Animal Hygiene (zoohygiene), presently taught in the third year of the program. The aim of the course has been to teach students how to optimize the ethological, ethical, and ecological aspects of hygiene in the context of animal production and animals' welfare needs. Milk, meat, and egg production are included, and farm visits are made. Herd health management is addressed as well. Through this course, students learn to assess the welfare and hygiene of animals in housing and at pasture, as well as the welfare aspects of animal transport. Students must also suggest concrete measures to be adopted in various situations where welfare and production are reduced. A good additional way of testing proficiency would be for students to revisit to the farm concerned later in the program and re-evaluate the situation there.

In the winter semester of 2003, an elective course was introduced for students in third year and above titled Problem Behavior in Companion Animals. This course includes 24 hours of lectures and 12 hours of practical work covering the aims of behavior medicine, basics of neuroethology, and behavior problems in dogs, cats, horses, and exotic birds. Prevention, therapy, and behavior modification techniques are also included. Instruction takes a number of different forms, including lectures; hands-on training with dogs (handling with rewards, shaping, clicker training, use of Gentle Leader collar); video and photo documentation of cases; and a visit to a shelter. This course also involves general welfare issues of the animals dealt with, and particularly of those with behavior problems.

In Europe, there have been initiatives promoting the teaching of animal welfare. One of them was The AFANET Aristoteles meeting "Teaching Animal Bioethics in Europe," held in May of 2002 in Nancy, France.<sup>14</sup> Participants from many European countries presented results from a survey on teaching bioethics and welfare in their countries. Some regional differences were found. Another initiative was the Central and Eastern European Conference on the Integration of Animal Welfare in Higher Education, held in 2004.<sup>15</sup> This conference was initiated by

the World Society for the Protection of Animals and the Compassion in World Farming Trust. Instructors from veterinary schools in the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia, Sweden, and the United Kingdom shared their experiences and methods of instruction. The meeting demonstrated a rapidly growing awareness of welfare issues among faculty at veterinary schools. Such meetings form a good basis for promoting and sharing new teaching materials and continually improving instruction.

#### **FACULTY OF VETERINARY MEDICINE, UNIVERSITY OF HELSINKI, FINLAND (LAURA HÄNNINEN)**

The University of Helsinki is the only Finnish university that offers academic veterinary education. Animal welfare is one of several themes integrated throughout the six-year program, with emphasis on farm animals and animal welfare regulations. Our main teaching goal is that veterinary students understand the critical points of animal welfare, especially in production animal practice. We define welfare as a measure of how animals are able to cope with their environment and/or how the Five Freedoms<sup>5</sup> are achieved. We concentrate on enhancing practical knowledge of how animal behavior and the awareness of species-specific needs can work as tools for clinical and preventive veterinary medicine.

The basics of animal welfare and ethology are integrated in a three-and-a-half-study-week course in the second year. The goal of this course is to teach students to understand the critical animal welfare points in animal production. Instruction is carried out by multiple teachers, with discussions, labs on handling practices, farm visits, and group work. Students' skills are evaluated during discussions and group work and via a written exam. In the third year, pain management is learned as part of the pharmacological coursework. Students also participate in a prepared ethical debate. The students select the questions themselves and ask one of the specialists at the faculty to outline the subject concerned. Ethical problems such as pain medication and food hygiene or medication in organic farming are discussed.

During herd health studies in the fourth and fifth years, the students evaluate, in practice, farm conditions and animal welfare law. They are also taught how to use animals' behavioral cues (e.g., tongue rolling, queuing at automatic feeders, and tail biting) to evaluate the production environment. The teaching goal is that students learn how to identify and deal with situations where welfare is reduced, and learn how to advise farmers or owners. In the small animal and horse clinics, advisory work is more difficult, as the original management and environment of the particular animal cannot be observed. Nevertheless, in an unpublished survey of faculty conducted by the author in 2004 (response rate 51%), 100% of the horse clinicians and 71% of the small animal practitioners stated that they include at least some animal welfare assessment in their teaching.

Both state and private veterinarians have responsibilities in terms of animal welfare law. Thus, it is important for graduate veterinarians to have both knowledge of animal welfare law and the administrative skills to apply it when welfare deficiencies are noticed. Animal welfare law and regulations are taught as integrated courses during the

second year (environmental regulations for species), the third year (medication), the fourth year (transport and slaughtering), and the fifth and sixth years (administration of animal welfare legal offences).

In addition to the courses outlined above, students may choose an optional one-week course on animal welfare after their second year of study. During this course, which is focused on farm animals, students are taught about motivation, evolutionary influences, and behavioral disturbances. Students are also given an overview of the faculty's research. Furthermore, additional ethology and welfare lectures are integrated into some optional courses offered from the second year on (depending on course prerequisites), such as a lecture on calves' behavioral needs given in a course on health care for calves. Every year, four or five students base their final thesis on the animal welfare and ethological research projects performed at the faculty.

Methods of student assessment vary with the course in which welfare is taught. An ideal method of evaluation would be to let students assess clinical cases of animals with abnormal behavior in terms of the evolutionary, legislative, and management factors involved. This would reveal their ability to adapt their knowledge to new contexts. Testing whether students can adequately persuade farmers to change their management systems into economically sustainable, animal-friendly systems would also be important. For pet and horse owners, the graduating veterinarians should have the knowledge needed to promote species-specific environments and handling as part of preventive veterinary medicine.

In the above-mentioned survey of the academic teaching staff in 2004, 90% stated that animal welfare is moderately or very relevant to their subject. Most instructors reported that they include some or many ethical discussions of welfare in their courses. Only 12% reported having no ethical debate about animal welfare. Moreover, several instructors wrote that they note students' knowledge of animal welfare during free discussions. Although the term "animal welfare" appears only a few times in the course descriptions, the teachers perceived animal welfare as a common theme in the veterinary program. Seventy percent and 68% respectively incorporate into their lessons at least a moderate amount of information about species-specific behavioral needs or environmental conditions. Further, 66% of the teachers have integrated at least some information about pain relief methods into their teaching, and 53% include information about animal welfare assessment. Accordingly, the majority of respondents reported having a moderate amount (54% of respondents) or a lot (17% of respondents) of information about animal welfare law incorporated into their lectures.

#### **SCHOOL OF AGRICULTURE, FOOD SCIENCE AND VETERINARY MEDICINE, UNIVERSITY COLLEGE DUBLIN, IRELAND (ALISON J. HANLON)**

Animal welfare is a core component of pre-clinical training in veterinary medicine at University College Dublin. The instruction is given in the second year of the five-year program, as part of a 16-lecture course in animal behavior and welfare. The welfare component of this course is designed to provide comprehensive coverage of animal

welfare issues and to maximize student learning and critical thinking by embracing a variety of teaching formats. The learning objectives of the course have been developed using Bloom's taxonomy:<sup>16</sup>

- to discuss the concepts of animal welfare
- to explain and analyze animal welfare and ethical issues arising in farm, companion, and zoo animal species
- to demonstrate the ability to
  - organize and conduct an on-farm assessment of animal welfare
  - evaluate data collected
  - propose appropriate recommendations
- to critically evaluate scientific and non-scientific resources on animal behavior and welfare

The main learning outcomes are to enable students

- to enter into scientific and ethical dialogue on animal welfare issues
- to evaluate farm animal welfare problems as well as companion animal issues

The teaching includes lectures, video tutorials, problem-based learning (PBL), a visit to Dublin Zoo, an on-farm animal welfare audit, and independent study. The lectures are designed to provide a framework of concepts and applied animal welfare problems. The other components are used to develop areas "headlined" in lectures and provide further opportunities to discuss the topics in greater depth. Blackboard,<sup>a</sup> an Internet-based course management tool and "virtual learning environment," is also used to complement materials discussed and presented in class and to facilitate a discussion forum.

Students receive eight lectures in animal welfare; laboratory animal welfare and welfare of wildlife are presented in a separate module. The eight welfare lectures start with an introduction to animal ethics, followed by the concepts and assessment of animal welfare. The Five Freedoms<sup>5</sup> are used to structure the assessment of animal welfare. Species-specific animal welfare problems and generic issues such as handling, transport, and slaughter are presented in lectures as well as tutorials. Student queries during lectures are often discussed on the Blackboard forum. In addition, video tutorials are conducted in groups of approximately 20 students. Students are shown a video, followed by a summary of the points and a tutorial exercise. Production diseases and transportation stress are two themes currently covered. PBL tutorials are also used.<sup>17</sup> These place responsibility for learning on the student, with the general aim of promoting critical thinking and communication skills during knowledge acquisition. The PBL tutorials are conducted in groups of approximately 10 students, over two sessions. Real cases are used, covering a variety of companion and farm animal welfare problems, such as ritual slaughter, transportation of horses and pregnant heifers, inappropriate castration of cattle, tail-biting of weaner piglets, and elective cesarean sections in pedigree cats. The cases are based on real events and are written by veterinary surgeons in Ireland; this helps motivate student

learning, as real cases stimulate greater interest and learning than contrived problems.<sup>18</sup> Real-life cases often have the added benefit of being multidisciplinary in nature. This enables students to integrate their knowledge in an applied context and helps prevent students from compartmentalizing subjects and restricting their understanding of a subject to a specific course or lecturer.<sup>18</sup>

The on-farm animal welfare audit has the following learning objectives:

- to demonstrate the ability to organize and conduct an on-farm assessment of animal welfare, to evaluate the data, and to propose appropriate recommendations
- to demonstrate the ability to critically evaluate scientific and non-scientific resources on animal behavior and welfare

At least one week before the practical exercise, the students are given guidelines and are set an assignment. Working in designated groups, they prepare a checklist to evaluate the welfare of animals in the college's dairy and calf unit. The exercise is divided into three parts: the welfare audit of the dairy and calf unit; the evaluation of the results, the proposal of recommendations, if appropriate, and the preparation of a summary presentation; and the presentation of the results and recommendations to the class. The presentations are followed by a review of the beef and horse unit, including a summary of the criteria used to assess the welfare of beef cattle and horses. In the latter case, forms of environmental enrichment are demonstrated and traditional methods of "treating" stereotypies are discussed.

The course evolves each year to reflect developments in European Union legislation and in scientific research and student understanding. The latter is assessed by formative and summative course evaluations. Formative tests are conducted on the first day of the course, midway through, and toward the end. This provides both students and instructors with regular feedback on the students' existing knowledge and understanding. This information is used to adapt lecture content. Summative assessments are conducted at the end of each semester. The semester 1 assessment was formerly a multiple-choice examination but is currently under review. The semester 2 examination comprises written, practical, and oral components. The written paper is based on a data set or case history, which each student has to evaluate. It gives students the opportunity to demonstrate both understanding of theoretical concepts and practical applications of the subject. The relationship between teaching, learning, and assessment is often overlooked in education. Didactic teaching promotes shallow learning, as may traditional forms of assessment such as multiple-choice and short-answer questions.<sup>19</sup> At the faculty/college, initiatives have been taken to develop critical thinking; however, disparity still exists between some teaching formats and assessment.

Animal ethics and animal welfare are fundamental components of veterinary science. This should be reflected in the veterinary curriculum and by the veterinary profession. In the curriculum, the challenge is to present a course and associated assessments at a relevant time in the undergraduate program, in order to maximize student learning. Animal welfare should not be confined to a single course but should be integrated across the curriculum to avoid

students' compartmentalizing it to a particular course or lecturer. The challenge to the veterinary profession is to encourage lifelong learning, to ensure veterinary surgeons' continued awareness of animal welfare issues, and to lead by example by promoting best practice to all persons involved in animal use.

**FACULTY OF VETERINARY MEDICINE, NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO (FRANCISCO GALINDO AND ANNE MARIA SISTO)**

Between 1990 and 1993, courses in applied ethology and animal welfare were instituted at the Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México (FMVZ-UNAM), with lecturers brought in from Europe and the United States. These courses set the stage for academic programs in applied ethology and animal welfare in Mexico.<sup>20</sup> In 1993, FMVZ-UNAM created the Department of Ethology and Wildlife and approved a new undergraduate curriculum that includes compulsory courses in applied behavior and welfare.

Animal welfare is taught in two compulsory courses in the first and second years. These are complemented by a bioethics course taught also in the first year. The faculty also offers two graduate courses on these topics. The primary teaching goals at the undergraduate level are to develop students' understanding of the basic principles of the study of animal behavior; to highlight the application of behavioral principles to the handling of animals; to strengthen students' theoretical background so that they can understand the concepts of and assessment methods for stress and animal welfare; and to develop students' awareness of the importance of animal welfare and its role in ethics, animal production, animal health, animal ownership, and animal research.

The first-year course consists of 64 hours taught over 16 weeks. Topics include an introduction to animal behavior; the causes of behavior; and the ontogeny, function, and evolution of behavior. In addition, there are theoretical and practical units on basic ethological principles and the behavioral and welfare problems of farm animals (pigs, poultry, cattle, goats, sheep, horses, and bees), companion animals, wildlife, and laboratory animals. Students visit four university farms and are taken to a zoo in Mexico City.

The second-year course includes neuroendocrinology and applied physiology in the context of assessing welfare. The course consists of three units, each of five hours. These units cover (1) control mechanisms of behavior (basic neuroendocrinology, motivational systems of behavior, and animal cognition); (2) stress and animal welfare (stress physiology, the conceptual framework of animal welfare, and animal welfare assessment, including short- and long-term indicators); and (3) housing, transport and slaughter, and the associated welfare problems.

The bioethics seminar given in the first year is a 32-hour course. Topics include bioethics principles; biological and phylogenetic similarities between humans and other vertebrates; human and animal relations; ethical proposals for the treatment of non-human vertebrates; the application of bioethics in veterinary medicine and animal production; and the professional ethics of the veterinarian and animal scientist.

The methods of student assessment in each of the three courses are outlined in Table 1. Ideally, assessment would have to include a written exam covering the theoretical framework of animal welfare and topics of animal husbandry, behavior, physiology, immunology, and health. In addition, assessment would include an on-site farm assessment, which would focus on objective and reliable indicators of animal welfare under different situations, as applied to farms with poor and good welfare standards. This would allow the integration of welfare assessment with other aspects such as production and health.

Since UNAM developed the new undergraduate curriculum and animal welfare courses, several universities in Mexico and elsewhere in the region have taken these courses as a model program. This has also provided the opportunity for joint projects. In addition, 10 continuing education courses have been organized on different topics of applied ethology, with the participation of invited international speakers; and in 1996, the Mexican Society for Veterinary Ethology (SOMEV) was established. These developments, coupled with collaborative agreements with other universities, governments, and non-governmental organizations, both national and international, have enriched the academic and research areas of the animal welfare group at FMVZ-UNAM, allowing us to help fulfill the social responsibility of our university.

**MASSEY UNIVERSITY VETERINARY SCHOOL, NEW ZEALAND (KEVIN J. STAFFORD AND DAVID J. MELLOR)**

Animal health and nutrition are important elements of animal welfare and have always been part of the traditional veterinary curriculum. However, animal welfare implies a more holistic attitude towards an animal's life. This attitude includes attempts to understand how an animal feels with regard to pain, distress, anxiety, fear, and pleasure. The approach also includes attention to the animal's comfort and its ability to express normal behavior. These considerations have not been part of the traditional veterinary curriculum, having largely been added only within the last two decades. The historical, philosophical, and legal aspects of animal welfare and animal rights have also become important.

Ruminant livestock are of particular importance to the economy of New Zealand, and animal welfare research has tended to concentrate on their welfare.<sup>21</sup> Most of this work has been carried out at the veterinary faculty of Massey University, and those involved in research have led the way in teaching animal welfare to veterinary undergraduates. At Massey University, an evaluation of the teaching of animal welfare to veterinary undergraduates was undertaken in 1991, a professorial chair in animal welfare science was established in 1994, and, building on a decade of active research and scholarship in the area, the Animal Welfare Science and Bioethics Centre was launched in 1998. These events demonstrate a clear commitment by the university to teaching animal welfare and promoting research into animal welfare science.<sup>21</sup> Thus there is now a group of people actively engaged in research in animal welfare, a subject that is taught to undergraduates in the veterinary, agriculture, animal, and biological sciences.

In the early 1980s, the welfare of animals at slaughter was discussed with veterinary undergraduates during public health lectures. In the late 1980s and early 1990s, other aspects of animal welfare were taught *ad hoc* by interested academics as part of ethology, physiology, and clinical studies. However, following a review of the curriculum in 1993, the basics of animal welfare are now taught in first year, while other aspects are taught where pertinent throughout the rest of the program. The current program is five years or 10 semesters long. Each semester includes 13 weeks of teaching, a study week, and examinations.

An examination at the end of the first semester in year 1 is used to identify students who are then accepted into the veterinary program proper. In semester 2, these students take a course called Animal Behavior, Welfare and Handling, consisting of 52 hours of lectures and up to 24 hours of practical animal handling. Seventeen lectures are devoted to different aspects of animal welfare and animal rights. The other lectures cover an introduction to applied ethology; the behavior of domestic species; small animal behavior therapy; and human-animal interactions. The lectures directly relating to animal welfare cover the historical, philosophical, and legal aspects; non-governmental organizations; defining animal welfare and measuring it; pain and suffering; stereotypic behavior; animals' needs; choice tests; demand curve tests; and the importance of good human-animal interactions, especially with farm animals. The welfare of farmed deer is emphasized in this course and again in final year, as this species is in the process of being domesticated and the annual harvest of velvet from stags provides a useful example of ethical decision making. At the end of the semester 1, the course is examined by means of a three-hour exam, and students must pass a practical test on animal handling.

After the first year, students spend some weeks on sheep farms (four weeks) and dairy farms (four weeks), on horse establishments and with a farrier (three weeks), and with a veterinarian (12 weeks). Students are expected to use this time to develop their practical knowledge, but for many it is their first exposure to farming or horse management, and they often come back to school with unresolved animal welfare questions, which they then discuss with their peers and instructors.

In second year, during the teaching of physiology, instruction is given for six to seven hours on perinatal life and awareness; this discussion is used to underpin different concepts of animal welfare. Additional time is committed to the implications of animal use in biomedical research, the importance of the three Rs (reduction, replacement, and refinement), and the use of animals in teaching. Few live animals are now used in the teaching of physiology, and when animals are used, the reasons are discussed with the students to allay concerns and to justify the animals' use. Alternatives are also offered. Veterinary anatomy is taught using cadavers, but more and more it is taught using computer models as part of a definite trend to reduce animal use in teaching and replace it where possible. Students are made aware of this trend and of Massey's innovative, and internationally recognized, efforts in this direction.

In the fourth and fifth years of the program, during teaching on veterinary public health, the importance of maintaining

high standards of animal welfare in slaughter plants is emphasized. The fourth year includes lectures on humane slaughter procedures and on the management of livestock during transport and lairage before slaughter. Students spend one week in a slaughter plant. In clinical training (lectures and practical work in years 3 to 5), during coverage of livestock, poultry, and companion and wild animals, students are encouraged and expected to discuss the animal welfare and ethical implications of what they are engaged in. In some cases, students may have to complete assignments on specific welfare topics. Some non-surgical veterinary procedures are common discussion topics. Examples include the electro-ejaculation of rams, the slaughter of diseased animals for autopsy purposes, and the insistence of some owners on keeping companion animals alive even when they have very poor quality of life. As opinions on different aspects of animal welfare differ between clinical staff, this allows for debate among students and staff. The welfare implications of surgery are discussed, and modern developments such as hip replacement surgery or kidney transplants are considered. The importance of pain assessment and its prevention is taught during lectures and emphasized during compulsory clinical rotations in anesthesia and surgery during the fifth year of study. Fifth-year students are divided into small groups, and each group receives three, three-hour tutorials on aspects of animal welfare, as well as tutorials during the public health roster. Topics include the importance of animal welfare during veterinary practice, aspects of euthanasia, and the use of veterinarians by animal welfare and government agencies when investigating animal welfare cases. In addition, there are six lectures on animal welfare, ethics, and law.

At Massey University, emphasis is placed on teaching animal welfare as an integral part of the curriculum. Instruction takes place throughout the program so as to educate students about the significance of welfare in all aspects of human-animal interaction—including livestock and poultry production, companion animal ownership, wildlife management, and research—and with regard to the legal, social, and ethical implications of animal use.

#### **CAMBRIDGE VETERINARY SCHOOL, UNIVERSITY OF CAMBRIDGE, UK (DONALD M. BROOM)**

The University of Cambridge provides training in animal welfare to veterinary students and veterinarians.

#### **Veterinary Students**

In the 1970s, animal welfare was taught as part of animal husbandry courses and was also incorporated into clinical farm animal teaching. In 1986, a legacy from Colleen Macleod to the British Veterinary Association provided funds for a professorship in animal welfare at the Cambridge Veterinary School, the first of its kind in the world. Since then, animal welfare has been taught as a course in its own right to all veterinary students. The general concepts of welfare, stress, health, good and bad feelings, and need are introduced at the beginning of the course and their interrelationships discussed. In order to understand how indicators of poor welfare provide information about needs, it is necessary that students receive lectures on motivation at the beginning of the course or in a previous course. Methods of assessing and

using the following as welfare indicators are explained: abnormal behavior, adrenal responses, heart rate, other abnormal changes, changes in acute phase protein and enzymes in blood, immune systems, extent of clinical disease, changes in brain function, growth rate, reproductive success, and life expectancy. In addition to indicators of poor welfare, changes that indicate good welfare are described. Methods of evaluating the importance ascribed by animals to resources and to the avoidance of certain situations are discussed in detail. Basic biological information on behavior, regulatory physiology, immune system functions, and brain function is a prerequisite for understanding welfare assessment.

In parallel with this scientific introduction to the course, a lecture and a seminar on the ethical issues relevant to animal usage are given. The remainder of the course is devoted to specific topics. Some of these are more general, such as welfare in relation to attempts to improve animal production; welfare changes during disease; the consequences for welfare of genetic selection; and pain assessment. Other topics concern particular farming systems, such as those for broiler chickens, laying hens, fish, pigs, milk production, and veal calves. This list is arranged in order of the number of animals involved. The transport of animals, the slaughter of animals, and farm operations are also discussed. The course also covers welfare in relation to the assessment of the welfare of companion animals, the testing and use of laboratory animals, the keeping of animals in zoos, and the use of wild animals.

#### **Veterinarians**

Two courses for veterinarians are available, one on the Internet and one in the classroom. The Web-based course has been running for two years and is taught by members of the Cambridge Group.<sup>22</sup> It is a substantial and wide-ranging course. The classroom course runs for two weeks in September of each year. It was developed, with collaborators from several universities, for veterinarians wishing to take the Royal College of Veterinary Surgeons Certificate or Diploma in Animal Welfare Science, Ethics and Law. Many of those who attend the course are not from the United Kingdom, and some are not veterinarians. The members of the course benefit not only from the range of lecturers but also from interaction with others attending the course who are in veterinary practice, government veterinary services, or animal protection societies or who are dealing with animal welfare for commercial companies or producers' organizations. The context of this modular classroom course (and of courses given by Cambridge staff to government veterinary staff, graduate students, animal research workers, and so on in many different countries) overlaps with that described for the undergraduate course. The modular course differs in that some of the background information on behavior, physiology, pathology, and brain function is summarized as part of the first module on concepts and methods of assessment. There is a module on companion animals and law, taught by experts in these fields, that includes much more detail than is given to Cambridge veterinary students. The farm animal welfare module covers all the species mentioned for the veterinary students' course and farmed fish, as well as specific discussion topics requested by participants. The module on ethics and

laboratory animals is also much more detailed than that given to veterinary students and refers to ethical issues in relation to working animals as well as the species mentioned above. Prior to the two-week modular course, those attending are sent a substantial number of scientific papers, which they are asked to read so that they can participate fully in discussions.

#### **ROYAL (DICK) SCHOOL OF VETERINARY STUDIES, UNIVERSITY OF EDINBURGH, UK (MICHAEL S. COCKRAM)**

Animal welfare teaching is an essential and integral part of the undergraduate veterinary curriculum at the Royal (Dick) School of Veterinary Studies, University of Edinburgh.<sup>23</sup> The principal aim of our Bachelor of Veterinary Medicine and Surgery course is to ensure that graduates possess a degree that is registrable by the Royal College of Veterinary Surgeons (RCVS) and meets the requirements of the European Union (Council Directive 78/1027/EEC of 18 December 1978).<sup>24</sup> These requirements alone necessitate the inclusion of animal welfare within the curriculum. For example, the RCVS specifies (among its day 1 competencies) that a new veterinary graduate will need to have acquired a thorough knowledge and understanding of animal welfare legislation; the principles involved in the promotion of health and welfare; and the ability to advise on and carry out species-specific preventive and prophylactic programs that are commensurate with accepted animal health, welfare, and public health standards.<sup>25</sup>

The undergraduate veterinary course integrates a number of scientific disciplines to enable veterinary surgeons to apply a broad range of knowledge, understanding, and skills. Although specific sections of the course are identified under the title of "animal welfare," it is not taught as a stand-alone subject but is fully integrated within the course.<sup>26</sup> Like many such professional programs, the veterinary course suffers from curriculum overload as a result of the ever-increasing knowledge in many areas of veterinary science and practice. Over the whole course, we believe there are aspects (including animal welfare) that could be improved, and this concern is being addressed in a recently initiated program-wide curriculum review process.

In years 1 and 2 of the veterinary program,<sup>27</sup> animal welfare is taught and examined within the Introduction to Animal Husbandry course. This course describes the husbandry and management of the main farm and companion animals in the United Kingdom. Students are encouraged to critically analyze situations in which animals are kept on the basis of the health, welfare, and productivity of the animals. A main learning outcome is the ability to assess and provide advice on the welfare of farmed animals (on farms, during transport, and at slaughter) and companion animals, including horses. Within the context of husbandry, welfare and behavior are considered alongside other aspects of husbandry, such as management, housing, nutrition, genetics, breeding, economics, performance, and food safety. Materials on the principles of behavior, housing, and welfare of farm animals are provided for self-study, and whole-year discussions (often based on video material) are encouraged. The students also undertake extramural studies on a variety of animal units (e.g., farms, kennels,

and stables) in which they are required to produce a written report on each unit. This report consists mainly of information about the unit, but the students also describe examples of production, health, and welfare issues that they have discussed with the manager. Students must also write a detailed critical analysis of one unit, which is assessed as part of the animal husbandry examination.

In parallel with the animal husbandry course in years 1 and 2, students take other courses that include lectures and practical work on topics of relevance to an understanding of animal welfare, such as neurohumoral control, the nervous system, pain, and analgesia. These are followed in year 3 by more clinical and pharmacological aspects of pain and analgesia. In year 4, animal welfare is again included within integrated lectures on the husbandry and diseases of farmed animals. There is also a short course on farm animal welfare that mainly covers legislation and on-farm welfare assessments. The most interesting and fulfilling animal welfare teaching occurs within the small-group seminars that form part of the final-year rotations. Each student reports on and then takes part in a discussion about a farm animal welfare problem that he or she has seen when either "seeing practice" or visiting/working on a farm. This can be either a specific case study or a general problem. The report includes the nature and cause of the problem, a discussion of what action was taken or should have been taken, and the legal and ethical aspects. A brief written report on the problem is submitted and assessed.

Assessment of students in animal welfare is more problematic than in many other subjects, as there are differences both in approaches to the topic and in ethical viewpoints. Students cannot be penalized for holding a different opinion from that of the examiner. Legislation, however, provides a body of factual information of which students' knowledge can be assessed. In addition, the students can be assessed on their ability to demonstrate an awareness and critical analysis of the scientific topics related to animal welfare, the different approaches that are adopted to the topic, and current animal welfare issues as well as their ability to obtain and present balanced and comprehensive evidence.

Discussions on animal welfare issues with first-year students are productive. Many of the students demonstrate an interest in the subject and their minds are open and receptive to stimulating and provocative ideas. There is a tendency later in the course for students to concentrate on acquiring clinical skills and knowledge, with animal welfare existing as "just another topic" to learn for an examination. But final-year students, who have completed their lecture courses on all topics, have more time to reflect upon their experiences and have sufficient knowledge and practical experience to formulate valuable opinions on animal welfare issues. Given the wide range of demands placed on the undergraduate curriculum to ensure that veterinary graduates have the potential to undertake a wide range of duties competently, additional post-graduate education in animal welfare would be beneficial. This could include formal post-graduate courses, such as our MSc in Applied Animal Behaviour and Animal Welfare,<sup>28</sup> a postgraduate certificate awarded by the RCVS,<sup>29</sup> or a shorter continuing professional development course.

## **SCHOOL OF VETERINARY MEDICINE, UNIVERSITY OF PENNSYLVANIA, USA (JAMES A. SERPELL)**

Although animal welfare is not taught as a stand-alone topic in the veterinary curriculum at the University of Pennsylvania, the subject features prominently in three courses. One course, Veterinary Ethical Issues, is mandatory; the other two, Animals and Society and Animal Production Systems, are optional and include welfare among other topics. All three courses are taught during the third year of the four-year program.

The primary goals of Veterinary Ethical Issues are to enhance students' ethical literacy and give them appropriate theoretical and practical tools to assist in solving the kinds of ethical problems they are likely to encounter in veterinary practice. The course focuses on the four main sources of difficulty in veterinary ethical decision making: the obligation to accommodate simultaneously the well-being of patients and the interests of clients, even when these conflict; the fact that animals lack independent legal standing; the increasing societal pressures imposed on veterinarians by changing public views regarding the moral status of animals; and the inability of animal patients to provide direct information about their feelings and needs. Under the latter heading, considerable attention is given to the subject of animal welfare science and the relatively objective methods that are now available to evaluate the welfare of animals.

The course consists of six two-hour sessions over a period of six weeks and employs a combination of didactic lectures (30–40 minutes) on ethical theory and practice and small-group discussions of ethical case studies drawn from various branches of veterinary medicine. For these discussions, the class divides into pre-assigned groups (five or six students per group), and each group is allowed 30 to 45 minutes to discuss each case and answer questions related to ethical reasoning and the process of finding ethical solutions to difficult problems. Concerns about the welfare of animals (e.g., pain, suffering, distress, fear) are invariably prominent components of these case studies. For the final 45 minutes of each two-hour session, the class reassembles and spokespersons from each group present the results of the respective discussions. These reports are used to stimulate a more informal general discussion of the ethical issues raised by the case, including issues of animal welfare. Course grades are based on a written response to a final ethical problem (case study), which students complete either individually or in small groups. These responses are no more than six pages in length, and students are allowed three to four weeks to complete them.

Animals and Society is a 14-hour elective course that rarely attracts more than 12 students per year. Its goal is to introduce students to the background, history, and current focus of the public controversy on animal rights and welfare while providing them with the information necessary to formulate balanced and well-informed opinions on the many issues raised in this ongoing debate. Topics covered by the course have included the history of Western attitudes to animals; factors influencing the development of human attitudes to animals; animal rights versus animal welfare; animal sentience and cognition; the links between animal abuse and family violence; animal-assisted therapy; companion animal welfare and pet "overpopulation"; animals and

the law; and animal bioengineering. The curriculum varies slightly from year to year, depending on the availability of outside speakers and on other local events of interest, such as conferences and seminars.

The course typically comprises seven two-hour sessions over a seven-week period, and each session consists of a one-hour discussion of required reading materials relevant to the topic of the week. The students are given these readings the previous week. The readings are derived from published literature and are chosen to represent different sides of, or approaches to, the particular topic of interest. The class is divided into groups of two or three students, and each group is assigned one paper or article to read and appraise critically for the benefit of the rest of the class. When each of the groups has completed its report, the topic is opened up for general discussion. The discussion period is usually followed by a lecture on a prearranged topic, sometimes given by an invited outside speaker. Course grades are assessed on the basis of class participation and completion of individual six- to 12-page research papers on topics relevant to the themes of the course. Final paper topics are mutually agreed upon by students and the course organizer; the papers must be submitted for grading within two weeks of the end of the course.

Animal Production Systems is a 16-hour elective course that includes a single two-hour session on farm animal welfare. The rest of the course, which is taught by a diverse group of faculty, focuses on other contemporary issues in food animal (dairy, beef, swine, poultry, and aquatic) production systems, such as food safety, bio-security, antibiotics and antimicrobial resistance, and other public health concerns. The animal welfare component consists of two 50-minute lectures. The goal is to introduce the students to the major welfare problems associated with large-scale confinement systems for livestock production. In particular, the lectures focus on problems associated with neglectful care and poor or abusive stockmanship; routine husbandry and handling procedures that cause pain, fear, distress, or frustration; welfare problems associated with genetic selection for higher yields; and the effects of spatially and environmentally impoverished housing conditions. The emphasis throughout is evidence based and draws heavily on the findings of recent animal welfare science research. This component of the course is graded on the basis of a short written response (one page or less) to a question derived from the contents of the lectures.

It is doubtful whether written assignments or multiple-choice evaluations are effective methods of assessing students. An online system—such as the one being developed by Zanella and colleagues at Michigan State University's Animal Science Department, reviewed in this issue<sup>30</sup>—involving detailed species-specific comparisons between two (or more) different systems of housing and husbandry seems to provide the best existing model for the assessment of students' proficiency in animal welfare.

#### **CUMMINGS SCHOOL OF VETERINARY MEDICINE AT TUFTS UNIVERSITY, USA (PAUL WALDAU)**

While a cursory survey of the Tufts curriculum, as it appears on paper, would not reveal "animal welfare" as the title of any one course, there is in effect a curriculum-long, rather

than a course-long, focus on this issue. This emphasis has been a hallmark of the curriculum since 1980, when the first "signature program" at Tufts—the Ethics and Values Signature Program—was established.

From day 1, welfare concerns and values are an integral part of the student's education. For example, one of the first written communications received by all students (both new and returning students) when they come to campus at the beginning of each year is a memorandum from the Dean reiterating the school's long-standing policy on animal care and welfare. This memo lists the names and contact information of members of the important committees on campus that are charged with animal welfare issues, including the Animal Welfare Committee and the Institutional Animal Care and Use Committee). The Dean also expressly invites any student with concerns about animal welfare to speak directly to the Dean or the university's Associate Provost. In addition, the Center for Animals and Public Policy—the work of which is based on the tenet that animals matter in and of themselves, that human and animal well-being are linked, and that both are improved through enhanced understanding of their interactions—sponsors community-wide discussions on many different topics each year.

First-year students are immediately immersed in Tufts's important tradition of animal welfare through a required course entitled Human-Animal Relationships that sounds the basic themes of welfare again and again. These themes are also an integral part of the required third-year course Jurisprudence and Ethics, where professional ethical requirements and legal requirements are assessed in detail and then compared to guidelines that are part of each student's personal ethics, general social ethics, and philosophical or normative ethics.

In addition, the concept of "welfare" and the skills needed to make good welfare a reality are raised regularly in many other courses. Examples include courses that cover behavior of different species of animals; courses in which clinical skills and general handling of animals are taught; the biotechnology course, which includes a major ethics lecture; courses where laboratory animal medicine is discussed; courses that address the emerging field of shelter medicine; a special session convened annually on euthanasia; various wildlife-centered courses; and any number of our problem-based learning sessions. Concern for animal welfare is also a major part of teaching in our clinical rotations. During the fourth-year rotations, students participate in a mandatory seminar addressing ethical issues in context; each student picks her or his own topic. Welfare concerns are major points raised in these sessions, virtually always, and are handled by students working out their own views of the relevant issues, guided by the faculty member who moderates these sessions.

Beyond the formal curriculum offerings, numerous special lectures occur throughout the year in which highly specific welfare concerns are raised. Lectures include those given during the annual visits by major ethicists such as Bernard Rollin of Colorado State University and the special visits of scholars and specialists sponsored by student organizations or by the Center for Animals and Public Policy. Specific animal welfare issues are integral parts of these discussions, which regularly touch on

developments in various sciences and technologies, animal-related legislation or litigation, the ongoing debate about the handling of captive animals in zoos, and the remarkably diverse range of European, Asian, and other non-US practices and debates. In sum, welfare issues of great specificity and detail, as well as the most general issues, are raised again and again by a steady parade of diverse campus guests. In addition, faculty and administration regularly invite students, during their years in the community, to raise welfare issues outside the curriculum. Such discussions take place in campus-wide sessions convened by the Dean or by the Center for Animals and Public Policy that offer students and other individuals in the community a chance to raise welfare issues of many different kinds.

Throughout all four years of the veterinary curriculum, welfare concerns are of paramount importance in student evaluations, particularly in the assessment of applied skills in the final year. The school assesses each student on many different things, using a variety of methods. In the first three years, students are assessed on their acquisition and use of the basic ideas and concepts in the usual ways that academic knowledge is assessed. The methods used include examination of knowledge of the law and ethical guidelines, assessment of critical thinking skills, and observation and coaching regarding practical techniques. In their fourth year, which is spent in clinical rotations, students are told that they will be assessed very specifically on their ethical decisions and interactions with patients and clients.

The primary goal in raising animal welfare concerns at every turn in our curriculum and community life is to sustain a high awareness of the school's tradition of having faculty, staff, and students who care about the humane treatment of non-human animals. Tufts takes the position that while it has worked hard to be a role model for other institutions and communities involved with animals in any way, this privilege is without question a shared responsibility, such that everyone at the school must contribute. Our goal of keeping animal welfare concerns in the foreground of our veterinary education can be accomplished only if everyone practices the highest standard of animal care and welfare.

#### NOTE

- a Blackboard Inc., Washington, DC  
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