Opportunities for Learning about Animal Welfare from Online Courses to Graduate Degrees

Janice M. Siegford  ■  Stephanie Yue Cottee  ■  Tina M. Widowski

ABSTRACT

Knowledge of animal welfare has become essential for veterinarians. However, there is no clear consensus about how to provide veterinarians and students with this critical information. The challenges associated with finding qualified instructors and fitting additional courses into an already full curriculum mean that options for learning about animal welfare beyond the veterinary school classroom must be explored. Online courses can be excellent ways for veterinary students and graduate veterinarians to become familiar with current animal-welfare science, assessment schemes, and regulations while removing geographical barriers and scheduling difficulties. Faculty at Michigan State University have created an online animal-welfare course with lecture material from experts in welfare-related social and scientific fields that provides an overview of the underlying concepts as well as opportunities to practice assessing welfare. However, to develop expertise in animal welfare, veterinarians need more than a single course. Graduate degrees can be a way of obtaining additional knowledge and scientific expertise. Traditional thesis-based graduate programs in animal-welfare science are available in animal-science departments and veterinary colleges throughout North America and offer students in-depth research experience in specific areas or species of interest. Alternatively, the University of Guelph offers a year-long Master of Science degree in which students complete a series of courses with a specialization in animal behavior and welfare along with a focused research project and paper. In summary, a range of options exist that can be tailored to provide graduate veterinarians and veterinary students with credible education regarding animal welfare beyond the veterinary curriculum.

Key words: animal welfare, animal well-being, coursework, Internet, master of science

INTRODUCTION

Veterinarians in the United States and abroad are faced with growing public concern for the welfare of animals.1,2 In their role as experts trusted by the public, veterinarians are expected to make decisions and render judgments about the welfare of animals both in their care and beyond. To exert this leadership in a responsible way, veterinarians must have credible knowledge about animal-welfare science and related societal and ethical concerns.3–6 However, despite 20 years of discussion regarding incorporating animal welfare into the veterinary curriculum,4,7,8 growing pressure from the global community,9,10 and student expectations,11 few veterinary schools offer any courses that address the topic of animal welfare specifically.12–14 Even fewer schools make such courses required or include more than a cursory overview of the topic. Ideally, courses in animal welfare should be offered at veterinary schools in a consistent manner on a global scale, using existing expertise in an efficient and cost-effective manner.15 Because animal-welfare research incorporates many different scientific fields, instruction on animal welfare must be multidisciplinary as well.16,17

CHALLENGES FACING TRADITIONAL COURSES IN ANIMAL WELFARE

However, there are challenges associated with providing credible instruction in animal welfare to veterinary students and practicing veterinarians. The first is simply the difficulty of adding another course to an already full veterinary curriculum.18 This challenge is not unique to the subject of animal welfare, but the fact of the matter is that adding any new course (particularly a required course for first- or second-year veterinary students) is logistically next to impossible given room scheduling constraints and limited student and instructor time. Second, the geographic location of veterinary students and veterinarians seeking instruction often does not coincide with the location of qualified instructors in animal welfare.19,20 Practicing veterinarians are scattered throughout all communities, and few are near enough to a veterinary school to take courses there.

Most veterinary schools in the United States do not have faculty with specific training and expertise in animal welfare.19 Because there are few faculty in veterinary colleges with animal-welfare training and expertise, most U.S. veterinary students are at schools without welfare faculty. In contrast, all but one of the five Canadian veterinary colleges boast at least one faculty member with animal-welfare expertise. However, because animal welfare is a multidisciplinary subject, even in cases in which one or two faculty members with animal-welfare expertise are located at veterinary schools, a truly comprehensive and in-depth coverage of the topic requires a group of faculty committed to the subject.20 For example, survey or introductory courses should involve contributions from multiple instructors with expertise in different areas such as pain management and animal housing and in different species’ welfare requirements. Courses covering specific topics within animal welfare will be needed
to provide students with any depth of knowledge on the issues at hand.

Even beyond veterinary colleges, there are a limited number of trained instructors and faculty in animal welfare, and traditionally most of these have been housed in animal-science departments. Further compounding this problem, not every veterinary school is located at a college or university that has an animal-science department. And of course, not all animal-science departments have faculty specializing in animal-welfare science. The end result is that there are few veterinary schools with faculty of their own or at the same institution who have expertise in animal welfare. However, there are some exceptions to this rule. Veterinary schools such as University of California, Davis; Iowa State University; Cornell University; Michigan State University; Ohio State University; University of Pennsylvania; Washington State University; and most Canadian veterinary colleges are examples of veterinary schools with animal-welfare experts on faculty. Some of these positions have been added very recently, and therefore the number of faculty positions in animal welfare in veterinary colleges or jointly appointed between animal-science and veterinary departments is growing.

THE CASE FOR ONLINE COURSES IN ANIMAL WELFARE

Given the intense curricula of veterinary schools and the current scarcity of instructors trained in animal welfare, a nontraditional approach is needed to educate veterinary students and graduate veterinarians on the topic of animal welfare. Online education works for animal welfare for several reasons. First, it allows for collaborative content assembly and delivery, pooling resources to create the depth and breadth needed to teach this multidisciplinary subject. Providing courses online also allows instructors and students from varying geographic locations to participate in a single course. Online formats can allow students to complete material according to their schedules and at their own pace. Thus, online courses can overcome many of the challenges associated with providing veterinarians and veterinary students with credible education in animal welfare.

Online Animal-Welfare Course at Michigan State University

Faculty at Michigan State University (MSU) have developed a Web-based animal-welfare assessment course for graduate and veterinary students. A problem-based approach is used to teach students to assess animal welfare from a scientific perspective, and the course incorporates interactive media and software to enhance the learning experience. Lectures for the course were created with the help of animal-behavior and -welfare experts from the United States, Canada, the United Kingdom, and Australia and cover a range of welfare-related topics (Table 1). Course lecture material was prepared using PowerPoint and Adobe Presenter software and then inserted into MSU’s course management system (ANGEL). A series of discussion forums, group assignments, online quizzes, and virtual exercises are used to help students assimilate the material presented in lectures and in additional readings. Because students taking the course come from across North America and around the globe, an asynchronous format was adopted that allows for discussion and interaction across multiple time zones as well as for different personal schedules. To further allow students to work at their own pace, course material has been divided into three 5-week-long units with a deadline at the end of each unit. The deadlines keep students on track but provide enough flexibility within each 5-week period to let students complete the material as they have time in their schedules.

Students practice welfare assessment in the online course using comparative exercises, called scenarios, in which they must evaluate and compare the welfare of animals in various hypothetical situations. Information on the management, husbandry, veterinary care, and physical and social environments associated with the animals at different facilities is presented in a virtual PowerPoint-style presentation. Images and video clips depict the animals and their environments, and PDFs of scientific literature and Internet links to standards and legislation provide students with in-depth background information. At various points throughout the scenario, the students make decisions about the relative welfare of the animals (i.e., does the housing situation promote better welfare at Farm A or Farm B?) as they build toward an overall assessment of the animals’ welfare. Students are asked to justify their assessments using scientific evidence and to discuss how confident they feel in their decision. Scenarios have been developed depicting various animal-related situations, for example, livestock in production, companion animals, laboratory animals, and exotic species kept in captivity. Each scenario in the online course has been evaluated for completeness and accuracy, and the comparative welfare conditions ranked, by an international panel of animal-welfare experts. In addition to providing students with practice assessing welfare, the scenarios serve to inform students of current practices and to demonstrate that there is a continuum between good and poor welfare. These hypothetical situations are also an ideal method of providing students with the opportunity to evaluate more diverse animal-welfare situations than would be physically possible and without the time and expense of travel.

As the final project in the course, students create their own welfare assessment scenario for a species of their choosing. They are required to base their information on realistic situations and practices and to provide citations and photo credit information. Students must also create an accompanying assessment key that ranks the welfare of the animals in each aspect presented in the scenario and provide an overall welfare assessment and rationale. Their assessment should be based on scientific information to the greatest degree possible. The final project allows students to synthesize what they have learned throughout the course and to gain an appreciation for how much (or little) scientific research has been done to understand the welfare of particular species.

Lecture and scenario content are reviewed on a yearly basis to correct problems, update links to other material, and ensure that all technology is functioning well. To remain abreast of advances in animal-welfare science and
the rapidly changing legislation and assessment schemes focusing on animal welfare, the content for the course is currently being updated by the contributing lecturers and course instructor.

The online course has been offered eight times at MSU since fall 2005. A total of 136 students have taken the course; 35% of these students were not affiliated with MSU. Students have taken the course from Kenya, Nepal, Costa Rica, Thailand, Norway, Canada, and states across the United States. Approximately 30% of the students in the course have had a veterinary orientation (e.g., pre-veterinary undergraduates, veterinary students, practicing veterinarians, and veterinary educators). Students who are not affiliated with MSU and who wish to take the course can complete a free online application to become a Lifelong Education student at either the undergraduate or the graduate level, depending on their previous educational experience. Once accepted as a Lifelong Education student, the individual can enroll in the course using MSU’s online enrollment system. Thus, the entire process from application to enrollment to completion of the course occurs online. The cost of the course for the semester of enrollment is determined by MSU’s tuition.

**Table 1: Organization of and Material Covered by Michigan State University’s Animal-Welfare Assessment Course**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lecture Topics</th>
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<tr>
<td>Unit 1</td>
<td>Defining animal welfare&lt;br&gt;- Definitions of animal welfare and evolution of the concept&lt;br&gt;- Behavioral indicators of animal welfare&lt;br&gt;  - Tinbergen’s four problems&lt;br&gt;  - Motivation of animals&lt;br&gt;  - Behavioral abnormalities (e.g., stereotypes and excessive aggression)&lt;br&gt;- Physiological indicators of animal welfare&lt;br&gt;  - Definitions and impacts of stress&lt;br&gt;  - Stress assessment techniques&lt;br&gt;- Impact of human–animal interactions on animal welfare&lt;br&gt;  - Co-evolution of humans and domestic animals&lt;br&gt;  - Reciprocal impact of humans on welfare</td>
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<tr>
<td>Unit 2</td>
<td>Production measures of animal welfare&lt;br&gt;- Use of common production measures to assess overall animal welfare&lt;br&gt;- Interplay of immunology and animal welfare&lt;br&gt;  - Health indicators and immune systems of common species&lt;br&gt;  - Measures of immune competence to assess the impact of stress&lt;br&gt;- Neurobiology of animal welfare&lt;br&gt;  - Neurobiology of stress and adaptation&lt;br&gt;  - Neuropsychological consequences of activation of the stress axis&lt;br&gt;  - Methods to assess changes in the central nervous system&lt;br&gt;- Animal welfare and suffering, including pain&lt;br&gt;  - Integrating information to understand causes of animal suffering&lt;br&gt;  - Behavioral deprivation, sensory inadequacies, over-taxation, and so forth&lt;br&gt;  - Pain, perception of pain, and pain control</td>
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<tr>
<td>Unit 3</td>
<td>Animal ethics&lt;br&gt;- Introduction to ethics&lt;br&gt;  - Schools of thought with regard to animals and animal welfare&lt;br&gt;- Animal-welfare legislation&lt;br&gt;  - Transitioning from ethics into legislation&lt;br&gt;  - History and status of animal-related legislation in the United States&lt;br&gt;  - Examples of international laws governing animal welfare&lt;br&gt;- Economic implications of animal welfare&lt;br&gt;  - Introduction to economics&lt;br&gt;  - Conflict between ethics and economics&lt;br&gt;  - Economic aspects of animal welfare&lt;br&gt;- Animal-welfare standards and assessment&lt;br&gt;  - Current welfare standards: private and governmental&lt;br&gt;  - Assessment schemes and types of audits</td>
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rate, which is calculated on per credit basis, and any additional fees that are levied on the course as determined by the MSU Controller’s Office.

The course has received very positive feedback from students, who particularly enjoy assessing welfare in the scenarios (and creating their own scenario for the final project). Students also perceive the course to be well organized and informative. Suggestions for improving the course include providing ways to access the lecture material offline and adding audio to the lectures to increase the number of modalities used to teach the material and provide additional depth.

In addition to the online course at MSU, there are several other notable online animal-welfare courses. The first, offered by the Cambridge e-Learning Institute and led by Dr. Anabela Pinto, is a 2-year-long course that consists of alternating weeks of reading and discussion forums and allows students to earn a Certificate in Animal Welfare. The University of Guelph has an online animal-welfare course titled Principles of Animal Care and Welfare, currently taught by Dr. Ian Duncan, that is offered to undergraduates during their third year and will be launching a graduate-level online course titled Assessing Animal Welfare in Practice in summer 2010. Recently, the World Society for the Protection of Animals (WSPA) launched an online version in Spanish of their WSPA Concepts in Animal Welfare course.

THE CASE FOR GRADUATE STUDY IN ANIMAL WELFARE

No matter how good the course, however, it takes more than a course or two for a veterinarian to really become a credible authority on animal welfare. Graduate degrees can be a way of obtaining additional education, credibility, and expertise for veterinarians with a strong interest in animal welfare or for veterinarians whose careers put them into roles where they must act as welfare experts.

MSc by Coursework and Major Paper

Faculty at the University of Guelph have developed a Master of Science degree by coursework and major paper with a field of specialization in animal behavior and animal welfare. The degree, which is currently offered through the Department of Animal and Poultry Science, can be completed in 1 year (three semesters). It is a multidisciplinary program that targets students in animal-care professions who are interested in meeting industry needs by providing a solid foundation in animal-welfare science and ethics, combined with practical training and experience that can be applied immediately on graduation. The program can also serve as a potential entry degree for students aiming for a research career in the expanding and popular science of animal welfare and for students pursuing careers in veterinary medicine.

The Guelph master’s program has five learning objectives for students in the program: (1) to develop an understanding of the historical, ethical, and cultural roots of animal welfare; (2) to develop an understanding of the physical and behavioral requirements of animals managed by humans; (3) to develop skills in evaluating animal welfare in scientific studies and in practical application; (4) to develop a broad appreciation of animal-welfare issues across animal industries (farm, lab, zoo or wildlife, sport, companion); and (5) to develop in-depth knowledge of animal-welfare issues and application in an area of specialization.

The program combines a core of graduate courses in animal-welfare science with selected electives that are chosen to complement the student’s area of interest. Students can focus on the welfare of food, laboratory, or zoo animals, with the possibility of some projects related to companion animals. Students must complete eight full courses, including four required courses that cover perspectives on animal welfare, statistics, critical analysis of scientific literature, and animal-welfare assessment. Elective courses cover a wide range of subjects, including behavior, environmental physiology, nutrition, reproduction, genetics, animal health, and management in species ranging from laboratory animals to companion animals to production animals. Students are also required to complete a supervised research project and accompanying major paper and to present findings from this work in a departmental seminar course. The project allows students to gain specialized knowledge, and the research and applied elements of the project can also provide students with hands-on experience. The major project is typically a short-term but meaningful project that has direct application to an animal industry. Students can do practical research, design and complete an experiment, develop assessment schemes, conduct literature reviews, and gain experience working with animals.

Students can work with advisors in the Department of Animal and Poultry Science or with advisors in the Departments of Population Medicine or Pathobiology in the Ontario Veterinary College. Many faculty at Guelph in either animal-science or veterinary departments have an interest in animal behavior and welfare but do not typically include it in their research. The small projects undertaken by the master’s students, conducted in collaboration with animal-welfare specialists, give these faculty the opportunity to add behavioral dimensions to their research and provide students with a multidisciplinary approach to addressing animal-welfare topics. The projects themselves can be conducted and supervised at Guelph or by partners in industry or government. Students have covered a wide range of species and welfare-related fields in their major projects, including thermoregulation in the hippopotamus; the impact of handling on pig behavior and welfare; palatability of different fish diets and dietary preferences in rainbow trout; avoidance behavior of laying hens in response to atmospheric ammonia; examining fear responses in lines of sheep that have been selected for high or low immune response when challenged with disease; and development of policies for keeping university livestock research facilities current with regard to best practices (e.g., euthanasia and routine surgeries).

The MSc offering at Guelph is now officially in its second year. The program has attracted a substantial number of students who hope that it will bolster their chances of getting into veterinary school. Of the eight students who completed the program in its first year, three were accepted to veterinary school after the program.
are currently 16 students in this MSc course, and many of these students also plan to apply to veterinary school at the end of their program. Feedback from students indicates that overall they enjoy the coursework and the ability to tailor the program to meet their interests.

Students who wish to enroll in the MSc program must apply through the Department of Animal and Poultry Science and indicate that they wish to specialize in the field of animal behavior and welfare. Students can apply from a variety of backgrounds, including (but not limited to) honors degree programs in animal or agricultural science, general biology, wildlife biology, and zoology. The adequacy of a student’s background and experience is assessed by an admissions committee before a student is offered admission. All applicants must meet the department and university minimum criteria for admission to graduate studies. In addition to assessing an applicant’s undergraduate transcripts, the admissions committee considers relevant work experience or recognized educational training in its decision. Also, as more students apply than there are available spaces, some selection is based on creating a diverse cohort of students.

Unlike students in a traditional thesis-based, graduate degree program, students completing the MSc by coursework at Guelph are not offered a graduate stipend, although some scholarships and teaching assistantships may be available to help defray the costs of tuition and living expenses. Project supervisors cover the costs of the research projects. One challenge in delivering this program has been finding enough research projects and supervisors as the number of qualified applicants has increased. One solution has been to develop partnerships with government, industry, and other research institutions that can provide project placements for the students.

### Traditional Graduate Degrees

In North America, animal-science departments have traditionally been the most common locations for students wishing to obtain MS and PhD graduate degrees in animal welfare. These degrees are typically conferred in the general field of animal science with an emphasis in applied ethology rather than in the specific area of animal welfare. The strongest graduate programs in animal welfare (i.e., programs with more than one faculty in animal welfare) in North America include the University of Guelph; University of British Columbia (including adjunct faculty at the Pacific Agri-Food Research Centre); Purdue University (including adjunct faculty at the US Department of Agriculture Livestock Behavior Research Unit); Michigan State University; Washington State University; University of California, Davis; and Iowa State University. Other graduate programs with animal-welfare faculty include University of Calgary, Colorado State University, Cornell University, University of Georgia, University of Illinois, Kansas State University, University of Minnesota, University of Maryland, Ohio State University, University of Pennsylvania, Rutgers, University of Saskatchewan, Texas A&M University, and Texas Tech University. Graduate programs in animal welfare in North America tend to emphasize research examining the welfare of livestock in production. Pigs, poultry, and beef and dairy cattle have received the most attention with fewer researchers examining small ruminants and equids and a very small number of researchers focusing on laboratory, exotic, and companion animals and fish.

Traditional graduate degrees, which emphasize research over coursework, allow students to pursue in-depth study on a focused topic. Students in these programs gain experience in analyzing, presenting, and writing about their research with the goal of publishing two or more peer-reviewed manuscripts in scientific journals and presenting work at least once at a professional conference at the national or international level. However, students seeking traditional, research-based graduate degrees often encounter a limited number of upper-level courses in animal welfare available at their individual institutions. Therefore, students may gain a great deal of knowledge in their particular area of study but may not have a broader understanding of animal-welfare science or the social and historical context of the field. An additional problem being faced by students pursuing traditional graduate degrees is the rapidly decreasing funding available from institutions for graduate stipends and tuition and health benefits. Because many students are unwilling or unable to pay the cost of 2–4 years of graduate school, the decreased availability of graduate funding will have ramifications in terms of the number of students receiving advanced training in animal welfare.

### DISCUSSION

Veterinarians are commonly regarded as the professionals with the greatest knowledge of animals. They are trusted by the public with all manner of decisions concerning animals, including those involving animal welfare, which has become an important factor guiding the voting and buying preferences of the general public. As the public turns to the veterinary profession for guidance in making animal-welfare-related decisions and assurance in the development of legislation and standards designed to improve animal welfare, there is a need for veterinarians who are properly educated to assume this responsibility. Veterinarians in the United States and abroad certainly have the ability to dramatically improve animal welfare through client interactions and through expansion of their professional duties to include welfare outreach and policy development. Veterinarians seem well placed to support human stewardship for animal welfare, and even if they are unable to convince clients directly to improve welfare, they can influence public opinion in their communities or be part of the policy-making process. Veterinarians have the potential to bring additional skills to the field of animal welfare and could work with animal scientists and other professionals to reach optimal decisions to enhance the welfare of animals. Additionally, by understanding the welfare requirements of the various species they treat, veterinarians could shift from problem-specific treatment approaches to context-specific, holistic approaches that evaluate the entire animal and its interactions with the environment.

However, before veterinarians can act in any of these ways, they must be broadly educated in animal-welfare science and assessment and in the complex societal issues associated with the field. Opportunities for learning about...
animal welfare through online courses or graduate degree programs provide veterinary students and graduate veterinarians with opportunities to gain this important knowledge in venues outside of the veterinary curricula.

CONCLUSION
There are a range of options beyond classes taught within the traditional veterinary curricula that can provide veterinarians and veterinary students with the knowledge and skills necessary to gain expertise in animal welfare. Online courses in animal welfare, such as the one offered at MSU, can serve as an evolving educational resource for members of the veterinary community, enabling them to receive high-quality, science-based instruction from international welfare experts regardless of geographic location. Online courses in animal welfare can be used to bridge an important gap in the veterinary curriculum and also to offer opportunities for continuing education to practicing veterinarians. Online courses could also be used to provide consistent animal-welfare education in veterinary schools across North America and beyond. For veterinarians who need greater depth of knowledge in relation to animal welfare, graduate programs such as the MSc by coursework and major paper offered at the University of Guelph provide credibility, expertise, and practical experience in animal welfare.

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**AUTHOR INFORMATION**

Janice M. Siegford, MS, PhD, is an Assistant Professor in the Animal Behavior and Welfare Group, Department of Animal Science, Michigan State University, East Lansing, MI 48824, USA. E-mail: siegford@msu.edu.

Stephanie Yue Cottee, PhD, is the coordinator of the MSc by coursework specializing in welfare in the Department of Animal and Poultry Science, University of Guelph, Guelph, ON N1G 2W1, Canada.

Tina M. Widowski, PhD, is the Director of the Campbell Centre for the Study of Animal Welfare and a Professor in the Department of Animal and Poultry Science, University of Guelph, Guelph, ON N1G 2W1, Canada.