IS IT POSSIBLE TO CHANGE VETERINARY STUDENTS' VIEWS TOWARD THE ENVIRONMENT AND ANIMALS BY TEACHING THEM ABOUT ECOLOGY AND ANIMAL WELFARE?

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Abstract

Animal welfare, ecology and environmental education are becoming more significant as part of veterinary curriculum. The general public's understanding of ecology animal welfare is growing. There is an increasing demand not just for professional abilities and knowledge but also for veterinarians' understanding how organisms interact with each other and their environments and their emotional sensitivity to their patients. This trend was adopted by the University of Veterinary Medicine and Pharmacy in Kosice, which included ecology and animal welfare in its curriculum for students of all study programmes. This article will go through the content of courses, their stages, study schedules, and teaching techniques. Using a survey, it will be determined how veterinary students' perspectives changed after the relevant topics were passed.

Keywords: *ecology, animal welfare, education, survey*

1. INTRODUCTION

The University of Veterinary Medicine and Pharmacy (UVMP) in Kosice is the only public higher educational institution in the Slovak Republic that offers undergraduate and postgraduate veterinary education.

The General Veterinary Medicine study programme is only available full-time and lasts 6 years (12 semesters). Teaching of ecology and animal welfare at UVMP is covered in the courses Basics of Ecology, Animal Ethology and Animal Husbandry and Professional Ethics, mostly at the theoretical level. The issue of animal welfare is also included in the courses.

The study of ecology and animal welfare is an important aspect of the veterinary undergraduate curriculum. Ecology, the scientific study of how organisms interact with each other and their environments, forms an essential component of our understanding of the world in which we and animals live. As a scientific discipline, ecology does not dictate what is right or wrong. Transferred to a public domain, ecology is a neutral science. It provides knowledge on which we can make decisions.

As concern rises over the human impact on the environment with mounting evidence of global warming, increasing rates of tropical deforestation, accelerating rates of species extinctions, and expanding use of genetically modified organisms, the need for ecologists to understand and address these problems has never been greater. The growth of human populations, human activities, and our technological capabilities have disrupted the trophic structure, energy flow, and chemical cycling of ecosystems in most areas of the world. Some effects are local, some regional, and a few are global [1].

The destruction of natural systems due to human encroachment has resulted in only a small proportion of natural, undisturbed habitat remaining in existence. Over 75% of the Earth's original forests have

been cleared or severely disrupted. The tropical rain forests are being cut at a rate of 500 000 km^2 per year and will be eliminated in a few decades.

One result of the destruction of natural habitat will be the extinction of many species as their ecosystems disappear. This biodiversity crisis has many aspects that must be considered in order to protect endangered species. Not only is localised protection necessary, but many migratory species are facing habitat destruction in both their northern breeding grounds and their tropical wintering grounds.

A variety of toxic chemicals, including unnatural synthetics, have been and are dumped into ecosystems. Many cannot be degraded by microbes and persist for years or decades. Some are harmless when released but are converted to toxic poisons by reactions with other substances or metabolism of microbes. Organisms acquire toxic substances along with nutrients or water, some of which accumulate in their tissues.

Whilst the challenges posed by these problems are enormous, rapid advances in Ecology and related environmental sciences are spectacularly increasing our abilities to predict, detect and respond to environmental threats. The unprecedented recent increases in knowledge of organisms, their functioning, genetics, behaviour, and interactions with each other are transforming our understanding of life and the best ways to protect and conserve it.

The general public's understanding of ecology, environmental protection and animal welfare is growing. With respect to animal welfare, there is a growing demand not just for professional abilities and knowledge, but also for veterinarians' emotional sensitivity to their patients. This approach was adopted by the University of Veterinary Medicine and Pharmacy in Kosice, which introduced. It was announced that the study of veterinary ethics and ethology will be included in the study syllabus based on the Commission EU's 2002 review and approximation of education outcomes in the area of veterinary medicine between the Slovak Republic and EU. Veterinarians play an important role in promoting animal welfare because they have scientific knowledge of the requirements and needs of animals, ethical reasoning and decision-making skills, and they enforce these within the framework of legislation. To fulfil this role in promoting animal welfare, it is essential that veterinary students receive a thorough education in animal welfare science, ethics, and law during their undergraduate studies, including practical teaching and a clear explanation of how this relates to other veterinary fields. Veterinarians are supposed to promote and secure the welfare of animals in their care by applying scientific knowledge and abilities to ethical reasoning and advocacy. Veterinary schools must provide veterinary graduates with the skills required to fill these professions. Graduates must be ready to take on the responsibilities of being a veterinarian and have the skills and knowledge to deal with the problems they will face when they start working. While students certainly bring their own experiences, understandings, and perspectives to veterinary school, the veterinary curriculum is an important source of formal animal welfare education. Students are also influenced by things they learn outside of the official curriculum, such as the thoughts and behaviours of their instructors and colleagues. This informal learning can be beneficial or detrimental to the values, behaviours, and conventions of the formal curriculum. Veterinarians have different ethical duties to many different groups of people, in addition to their overall duty to the "whole public."

Ecology as the quantitative study of interactions of organisms with their environment have provided a scientific basis for expressing the aims of environmentalism, a human system of belief that advocates a sustainable and respectful relationship between humans and the natural world and evaluating its goals and policies. It has taught environmentalists to look to the future with their eyes wide open, rather than narrowly focused on material welfare, economic wealth, and new conveniences.

With respect to the above mentioned, ecology, and animal welfare have been included in the curriculum for veterinary students of all study programmes.

2. MATERIALS AND METHODS

2.1. Materials

The issue of ecology and animal welfare is included mainly in the following subjects.

2.1.1. Ecology

Ecology is defined as the scientific study of the distribution and abundance of living organisms and how the distribution and abundance are affected by interactions between the organisms and their environment. If one looks at the definitions of ecology and environmentalism, one finds that they are closely related to each other as both talk about the nature of our environment. This makes people think that ecology and environmentalism are similar, if not synonyms for each other. However, they are not same, while ecology is the quantitative study of interactions of organisms with their environment, environmentalism is a human system of belief that advocates a sustainable and respectful relationship between humans and the natural world [1, 2].

Ecology is a multidisciplinary science that appeals to biology, climatology, chemistry, biophysics, engineering, mechanics, etc.

Ecology makes use of physics because all biotic processes has to do with the transfer of energy, as from producers, which take advantage of light energy for producing complex organic compounds, to bacteria, which obtain chemical energy by the disintegration of the molecular structures of other organisms.

Ecology uses chemistry because all the metabolic processes and physiology of biosystems depend on chemical reactions.

Ecology relates to geology because biomes depend on the geological structure of the environment.

For ecology, geography is a very important discipline because of the specific distribution of living beings on Earth.

Mathematics is crucial for ecology, for example for the calculus, statistics, projections and extrapolations when ecologists deal with specific information about the number and distribution of species, the evaluation of biomass, population growth, extension of communities and biodiversity, and to quantify the environmental pressures at a given biome.

Climatology and meteorology are significant disciplines that help ecologists to understand how the variation on climatic conditions at a given region influences on biodiversity. Climatology and meteorology help ecologists to know how the regional or global climate increases or reduces the probabilities of survival as of individuals as of populations and communities in a given region, and to relate the regional climate with the distribution of organisms on Earth [2].

As a broad discipline, ecology comprises many sub-disciplines. A common, broad classification, moving from lowest to highest complexity, where complexity is defined as the number of entities and processes in the system under study involves ecophysiology and behavioural ecology that examines adaptations of the individual to its environment, autoecology – study of the dynamics of populations of a single species, community ecology that focuses on the interactions between species within an ecological community, ecosystem ecology (flows of energy and matter) and landscape ecology studying processes and relationship across multiple ecosystems or very large geographic areas. Ecology can also be sub-divided according to the species of interest into fields such as animal ecology, plant ecology, and so on.

The teaching of Ecology consists of formal teaching (lectures), 2 hours per week and practical lessons 2 hours per week involving video presentations, discussion and trips to protected areas. The subject is included in the 1st year of veterinary studies.

2.1.2. Animal Ethology

An understanding of animal behaviour is important in animal welfare science. The teaching of Animal Ethology consists of formal teaching (lectures), 2 hours per week and practical exercises, 2 hours per week, by using the practical trips to farms, zoo and animal shelters. The subject is included in the 3rd

year of study. In the topic of Animal ethology, students will obtain knowledge of the principles of animal behaviour, be familiar with the behaviour of domesticated animals, and have information on the prevention and treatment of primary and secondary abnormal behavioural forms of animals. The practical examination of behaviour in various systems can also give information about animal preferences and motivation. Students will learn how to assess an animal's welfare and the elements that may influence it. They are trained in the methods and techniques for measuring well-being as well as the indicators of good and poor well-being.

2.1.3. Animal Hygiene and Welfare

The teaching of Animal Hygiene and Welfare consists of formal teaching (lectures), 2 hours per week and practical exercises, 3 hours per week involving trips to farms, zoo and shelters. The subject is included in 3rd year of study. The role of veterinarians in the process of siting and designing animal farms and individual animal houses is explained during the course, as well as hygiene requirements on building materials and constructions intended for animal production, veterinary-hygienic protection at animal farms, hygiene and technology of farm animal housing (cattle, pig, sheep, poultry, horses), welfare problems in different housing systems, and animal welfare. EU-legislation and national rules are also of important concern, with an emphasis on animal transit and slaughter.

2.1.4. Professional Ethics

The subject of Professional Ethics consists of formal teaching (lectures), 1 hour per week and practical exercises, 2 hours per week, using the teaching through informal discussions. The semester lasts 13 weeks. The subject is included in the 2nd year of study, within preclinical years of study. Objectives of the course Professional Ethics is to give knowledge about bioethics view on animals, their physiological and psychological needs and ethical interpretation of welfare.

The first segment of the course's theoretical instruction describes the many ways of thinking that drive human behaviour and evaluates the rightness or wrongness of acts, virtue or vice, the reasons that motivate them, and the goodness or badness of the consequences that may result. All ethical frameworks are discussed in terms of animal usage or veterinary activity. Another section of the lectures discusses the evolution of ideas and beliefs concerning animal rights and animal care. Other lecture topics include the theoretical basis of farm animal welfare, companion animal welfare, veterinary ethics, oath, and veterinary imperative. The framework of lecture instruction covers the fundamentals; however, small group teaching during seminars is more engaging. This is an effective method for transmitting information and enhancing students' communication abilities. Students learn to analyse and defend various points of view. Animal experimentation, euthanasia, slaughter, stray animals, and communication in veterinary practice are among the themes covered. Debates and role-playing sessions based on real-life scenarios are very popular. The advantage is that students may see for themselves the ethical issues that others involved in animal care and utilization confront [3].

2.2. Methods

2.2.1. Survey

We were concerned about the impact of the above-mentioned subjects on the formation of students' views. A survey for students was created to investigate how their priorities had changed. The questions were on various aspects of ecology and welfare. Students were asked whether the lectures and practical lessons changed their opinion yes-or-no questions in writing form.

All students enrolled in Basics of Ecology, Professional Ethics, Animal Ethology and Animal Hygiene and Welfare course at the Veterinary University in Kosice participated in the survey. The survey on ecology was completed by 268 students during the last week of the second semester while 356 students completed the second survey during the last week of the third semester.

Because there were few male students who participated, gender differences in survey responses were not assessed.

2.2.2. Ecology topics

Ecology of individuals; BioGeochemical cycles; Food chain, food web and ecological pyramids; Migration and dispersion; Population aspects, intraspecies and interspecies interactions; Community structure and development; Biodiversity; Ecosystems.

2.2.3. Professional training in animal welfare topics

Professional training in animal; Perception of animal welfare issues; Problems related to experiments on animals; Livestock breeding; Various areas of animal breeding; Pets breeding; Reasons for animal euthanasia; Meat and meat products consumption.

3. RESULTS

The results of both surveys are presented in Tables 1 and 2.

Ecology of individuals:	**Yes (%)**	**No (%)**
Adaptation	54	46
Temperature relations, ectothermy and endothermy	72	28
Water and energy relations	58	42
BioGeochemical cycles	82	18
Food chain and food web	69	31
Ecological pyramids	62	38
Migration and dispersion	49	51
Population system and population change:		
Reproductive strategies	64	36
Intraspecies interactions:		
Competition, territoriality	75	25
Sexual behaviour	74	26
Dominance hierarchies	81	19
Competition, predation, symbiosis	71	29
Ecology of communities:		
Community structure, distribution and development	78	22

Table 1. Ecology - Passing the subject of ecology topics has changed my opinion on the above topics

Regarding the first group of questions “Ecology of individuals” (Adaptation, Temperature relations, ectotermy and endotermy, Water and energy relations, BioGeochemical cycles, Food chain and food web, Ecological pyramids, Migration and dispersion), the majority of students answered “yes” (49 – 82%: training of the subjects changed their opinion on the topic.

The topic “Population system and population change” (Reproductive strategies), the students answered “yes” (64%: some students indicated this topic as the most interesting one and some said that they had met this topic for the first time).

The topic "Intraspecies interactions" (Competition, territoriality, Sexual behaviour, Dominance hierarchies, Competition, predation, symbiosis) significantly changed students´ opinion: the majority marked "yes". They changed their opinion in the range of 71-81%.

Regarding topic "Ecology of communities", (Community structure, distribution and development) all students changed their opinion on the subject (78%).

Written answers to a question are summarized as follows:

"Which topic from the entire semester you were most interested in?" Answers were especially: adaptation, water and energy relations, migration, sexual behaviour, competition, predation, symbiosis, development, experiments.

"Which topic did you meet in the classes for the first time?" Students specified: biological magnification, temperature relations, ectothermy and endothermy, biogeochemical cycles, ecological pyramids, community structure, distribution and development, the role of veterinarians.

Perception of animal welfare issues:	**Yes (%)**	**No (%)**
Animals´ castration	42	58
Ear cropping in dogs	36	64
Tail docking in pigs for preventive purpose	46	54
Problems related to experiments on animals:	31	69
Livestock breeding:		
I´ve changed my opinion on welfare in poultry farming	73	27
I´ve changed my opinion on welfare in pigs´ farming	61	59
I´ve changed my opinion on welfare in cattle breeding	38	62
Various areas of animal breeding:		
Breeding of fur animals	46	54
Using of animals in the circuses	51	49
Breeding of animals in the ZOO´s	48	52
Pet´s breeding:		
Dressing of animals	18	82
Somatic changes	45	55
Reasons for animal euthanasia:	61	39
Meat and meat products consumption:	18	82

Table 2. Animal welfare topics - Passing the subject of animal welfare topics has changed my opinion on the above topics

Regarding the first group of questions "perception of animal welfare issues" (castration, ear cropping, tail docking), the majority of students answered "no" (58%, 64%, 54%: training of the subjects did not change their opinion on the topic.

Also "problems related to experiments on animals" 69% of the students answered "no". However, some students indicated this topic as the most interesting one. Some said that they had met this topic for the first time.

The topic "livestock breeding" significantly changed students´ opinion: the majority marked "yes". They changed their opinion on welfare issues about poultry farming (73%), pig farming (61%), and cattle breeding (38%).

Regarding topic "various areas of animal breeding", most students did not change their opinion after classes (breeding of fur animals 54 %, using of animals in circuses 49%, breeding of animals in zoos´52%). The "pets breeding" ethical issues (dressing, somatic changes) did not change their opinion either. 61,5 % of students changed their opinions on the "reasons for animal euthanasia".

Written answers to a question are summarized as follows:

"Which topic from the whole semester you were most interested in?" Answers were especially: stray animals, euthanasia, welfare issues of breeding, experiments.

"Which topic did you meet in classes for the first time?" Students specified: welfare issues of farm animals, euthanasia, slaughter, the role of veterinarians.

4. DISCUSSION

The traditional view that veterinary medicine deals with animal health, public health, and biomedical science, can be reasonably extended to include ecosystem health [4] or put collectively as "one health." The application of the concept of health, therefore, ranges in scale from individuals to ecosystems. The emergence and importance of ecosystem health has been driven by the realization that dealing with animal and public health must occur in the context of a better understanding of ecosystem processes.

The exponential growth and development of human society and the subsequent enormous increase in impact on the earth's ecosystems affect negatively the natural processes upon which life depends. It has been asserted that biological security is the most important issue that human society has to face in the 21st century and that the veterinary culture and education have not adapted sufficiently to this situation [5]. A much stronger focus on ecosystem health in veterinary medicine would seem to be an essential step in rectifying this situation.

Livestock ecology is the scientific study of the interactions of domestic animals with their production environment. Such interactions have effects on livestock numbers, densities and their distribution. In modern agriculture, individual farmers should pay attention to a number of issues that may influence their farm management directly, such as animal welfare, local biodiversity, soil quality, carbon storage and greenhouse gas emissions. The changes in the Common Agricultural Policy (CAP) by the European Commission demonstrate the need for farmers to pay attention to such aspects. Many challenges lay ahead where the farm-level and the higher system levels need to be better connected. How can farmers contribute with their farm management to global ecological challenges? What does this mean for their land use? What is the opportunity for biofuels, which might generate value to many residuals of agriculture and provide a source of farm income? And at the regional level, how can modern farms be embedded in the rural landscape? More attention should be paid to robust farming systems that not only optimize their farm management around the animal, but also focus on the potential trade-offs of this optimization in terms of ecology and economy [6]. Veterinarians with perfect knowledge of livestock ecology may play an important role in this effort.

With respect to global climate changes everyone is concerned with emission of greenhouse gases (GHGs). Livestock are often considered agriculture's key greenhouse gas emitter, contributing more than one-third of agricultural emissions [7]. Typically, livestock production in the United States is highly specialized and intensified and is often cited as having both lower GHGs [on a per carcass weight (CW) basis] and land-use footprints than pasture-based livestock systems. Alternatively, pasture-based systems often have less GHGs intensity from a land use basis [8].

Immediate and far-reaching changes in current animal agriculture practices and consumption patterns are both critical and timely if greenhouse gases GHGs from the farm animal sector are to be mitigated. As consumers increasingly favour more environmentally friendly products and techniques, reducing consumption of meat, eggs, and milk, as well as choosing more sustainably produced animal products,

such as those from organic systems, may prove equally critical strategies [9]. Indeed, organic farming has the potential to reduce GHG emissions and sequester carbon [10]. Also, raising cattle for beef organically on grass, in contrast to fattening confined cattle on concentrated feed, may emit 40% less GHGs and consume 85% less energy than conventionally produced beef [11, 12].

The students were confronted with different welfare issues throughout the whole semester. The results of our study show that the topic "animal welfare" is new for students. Teaching about this topic can lead to the attitudinal changes toward animals. Few studies have investigated attitudes toward animals in veterinary students [13, 14] and demonstrated changes to the human-animal attitude and also human oriented empathy after animal-welfare courses.

The findings of some other studies [14, 15] suggest that veterinary students consider more important to have the necessary practical skills and knowledge to function as a veterinarian, but attitudes toward animals are important in influencing how animals are treated, too.

It is no doubt, that in 3rd year of study it is very early to give them all knowledge for clinical practice. This confirms the work of [16]. But teaching veterinary students about welfare issues related to the animals can positively influence their attitude towards animals and provide helpful guidance to the students faced with ethical dilemmas or for decision making in everyday clinical practice.

5. CONCLUSIONS

All the above mentioned indicates importance of good knowledge of veterinarians about interactions of organisms with their environment for addressing to these pressing problems. In our opinion it is advantageous that future veterinary surgeons can obtain knowledge of ecology already in the first year of their veterinary studies as this will help them throughout their studies and later in their practice to make the correct decisions. This is very good base for creation of interaction with animals.

It appears important not to provide to veterinary students only the relevant theoretical knowledge and necessary practical skills but also stress the welfare issues that help the animals to cope with their environment and the load on them that the intensive farming brings. Teaching veterinary students about welfare issues can positively influence their attitude towards animals and provide helpful guidance to the students in everyday clinical practice. The results show how important it is to teach the concept of animal welfare as a whole in university programs, as it could be the start of a more sustainable society that helps animals live in better conditions.

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