

# **Animal Testing at Dalhousie University: A brief insight into social, economic, and environmental effects of nonhuman animal testing**

Jessica Ellis, Mel Hall, Phil Ong, Leif Wege, Natalie Paterson, Chelsea Smith

## **Abstract**

The purpose of our research was to examine whether the use of nonhuman animal testing as a method of scientific progress is a sustainable undertaking. This report explored the opinions of literature sources through literature review and surveyed psychology students at Dalhousie. Our literature review emitted two different results. First, industries that used animal testing supported the practise, feeling that benefits of testing outweigh the costs. Animal tests contribute to preventing substances from harming the environment and health of Canadians. We found that 58% of psychology students agreed, feeling animal testing is sustainable as it can lead to new discoveries that helps humans and the environment. Second, we found literature written by experts on animal testing, which examines the idea that animals and the rest of our environment are at our disposal and we may deal with them as we wish. These arguments led to the belief that animal testing is not sustainable. This report discusses the controversy of animal testing, and concludes with the need for further investigation into the sustainability of animal testing.

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# 1. Introduction

## 1.1 Dalhousie University and the Role of Science

Dalhousie University is a scientific institution dedicated to teaching and research. Dalhousie has a wide range of programs and a broad scope of students. Various methods are employed by the university to teach these students and also by the university faculty conducting research. One of these methods is the use of nonhuman animal testing. Nonhuman animals have been used by humans for research for many centuries and the current form of the practise comes from a long history of the use of various animal species for human means. Animal testing includes pure research such as genetics, developmental biology, behavioural studies, as well as applied research such as biomedical research, drug testing and toxicology tests, including cosmetics testing. The use of animals for testing is now deeply entrenched in modern science, Dalhousie being no exception to this.

Scientific research plays a major role in our civilization. In a time where the degradation of the human condition and environment is becoming more and more prominent, largely as a result of scientific innovation, it is reasonable to question the methods of our scientific progress. Despite an overwhelming presence of scientific research dedicated to bettering the human condition, and more recently that of the environment, through progress in scientific branches, the global environmental and human condition appears to be getting worse. Since animal testing now plays such a prominent role in scientific research the issue arises as to whether these methods are useful and what direct or indirect effects the practise itself has.

## 1.2 Overview of Dalhousie's Stance toward Sustainability

### 1.2.1. Talloires and Halifax Declarations

Dalhousie, among other sustainability efforts, has signed the Talloires and Halifax Declarations. The Talloires Declaration, for example, states as its fifth action

Practice Institutional Ecology Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

The Declaration states that universities has a major role in education, research, and policy formation and that universities are therefore an important part to making changes towards sustainability happen.

The Halifax Declaration is the result of more than 100 universities from dozens of countries addressing the issues of sustainable development. The Halifax meeting was meant to add a specific voice to the growing concern for the continued and widespread degradation of Earth's environment. The fourth action of the Declaration is

*To enhance the capacity of the university to teach and practise sustainable development principles, to increase environmental literacy, and to enhance the understanding of environmental ethics among faculty, students, and the public at large.*

### 1.2.2. Dalhousie Student Union Sustainability Office (DSUSO)

The DSUSO is an organization in place to implement sustainability within the Dalhousie Student Union, by striving to make the campus ecologically aware, economically responsible, and socially equitable through communication with the student community (DSUSO, 2010). The goals of the DSUSO are to implement and fund student-run sustainability initiatives on campus, to inspire environmentally-conscious thinking in our community, to inspire behavioural change that reflects sustainable practices, and to engage with key decision making bodies within the DSU and the broader Dalhousie University community in order to promote decision-making that fosters ethical and environmental responsibility and accountability. Students from many departments at Dalhousie are involved in sustainability related projects, such as conducting research, hosting speakers, screening films, writing newspaper articles, organizing events and volunteering in the community. The DSUSO aims to unite these students under one sustainable organization.

### 1.2.3 The University Committee on Laboratory Animals (UCLA)

This information was obtained directly from the UCLA website. The UCLA's functions and policies coincide with those of the Canadian Council on Animal Care (CCAC). It is given official authority by the president of Dalhousie University. It represents the standards established by the CCAC. The Committee also reviews protocols concerning the use of animals in teaching and research at the university and categorizes the degree of invasiveness of the procedures. It ensures that animals receive proper veterinary care and that unnecessary suffering is avoided as much as possible.

The UCLA states

*“We believe that animal research is both necessary and ethical, since it advances our ability to improve human and animal well-being. Essentially all medical breakthroughs have depended upon the use of animals at some level, and animal-based research continues to be critical in the search for treatments and cures for many diseases including cancer, heart disease, neurodegenerative diseases, and infectious diseases”* (UCLA, n.d.)

The UCLA decides whether a proposed project has valid scientific goals and whether it is ethical and humane. It uses principles of replacing animals with alternatives whenever possible, reducing the number of animals used, and refining techniques to be as humane as possible.

## 1.3 Issues Surrounding Animal Testing

This topic is highly controversial. Supporters of the practice argue that medical achievements rely on the use of animals in some way, while others question its necessity. These opponents make a range of arguments: that it is cruel, poor scientific practice, cannot reliably predict effects in humans, poorly regulated, that the costs outweigh the benefits, or that animals have an intrinsic right not to be used for experimentation.

Using nonhuman animals for testing may suggest that animals are for humans to use. When Charles Darwin published *The Origin of Species*, he disputed the idea that humans are the center of the universe. Darwin argued that humans and nonhuman animals are all reactions of evolution

from living organisms and that humans are just part of the natural world, not above it (Stop Cruelty, n.d.). In Similarity, the organization ASAP, based in Halifax, is committed to challenging the view that nonhuman animals exist for human use and raising animal status beyond property. These non-anthropocentric views express that animals are not for humans to use (ASAP, n.d.). Using animals for testing suggests that humans are above nature and can use nature for their own benefits. This view may prohibit the environment from being fully protected.

Arguments against animal testing tend to be focussed on moral and ethical grounds. Scientific research, on the other hand, tends to pride itself in its objectiveness. Philosophical arguments may be heard and have already contributed to changes within the scientific community in regards to animal testing. The changes appear to come as a result of public pressures on researchers and not out of consideration of the individual test subjects (Greek & Greek, 2000). The reading of manuals and publications involving animals for procedures will show the subject's welfare is considered by the researcher on the grounds of scientific integrity to the experiment, minimized stress levels on the subjects bringing better results (see, for example, Council of Europe Treaty No.123 Article 3.10 on researcher-animal contact, 1986), and not necessarily for any intrinsic value the subject may have. While strong cases are made for animal welfare on philosophical grounds, any arguments made for the re-evaluation of the use of nonhuman animals for testing would have greater effect on the scientific community if presented through empirical evidence rather than philosophical arguments.

The research presented here is part of a growing concern regarding an anthropocentric world view most of the scientific community and the rest of society have taken, namely that the world is at the disposal of humans. While organizations such as the Canadian Council on Animal Care (CCAC) monitor the wellbeing of test subjects, the view that researchers have a given privilege of sacrificing individuals for increased knowledge goes unquestioned. Very little information exists on the sustainability of animal testing. While literature on subjects concerning animal welfare on moral and scientific grounds is extensive, the connection between animal testing and sustainability has not directly been made. We therefore wish to present preliminary exploration on this subject.

#### **1.4 Goals of this Project**

This report aims at investigating the sustainability of animal testing by exploring the opinions of students and various literature sources. Specifically we are asking what psychology students think of the sustainability of animal testing at Dalhousie and how this compares to literature findings on the social, economic, and environmental effects of animal testing. The Psychology Department was chosen as the starting point for this research because of the breadth of its studies, research ranging from behavioural to physiological investigations.

The research for this report comes from literature reviews exploring various viewpoints on the social, economic, and environmental impacts of animal testing. We have investigated stances taken by different authors and organizations on the continuing of animal testing. Exploratory surveys were also undertaken and will be discussed in detail. Overall we wish to examine whether the use of nonhuman animal testing as a method of scientific progress is a sustainable undertaking.

Our hypothesis is that psychology students do support the use of animals for research and teaching, that the literature review, however, will show nonhuman animal testing to be unsustainable.

## **2. Methods**

Preliminary research was done for this project in the form of reviewing reports published by current faculty members of Dalhousie, either working at Dalhousie or other universities. This was to establish that animal testing does in fact happen at Dalhousie. See reference section 6.2 for a complete list of papers examined.

### **2.1 Operationalizing Variables**

The first step we took in acting out our research question was operationalizing variables. We looked specifically to Psychology students for our information. Animal testing, we decided, means any research or teaching that uses non-human animals, which includes animals that are bred in captivity or captured in the wild. Sustainability was also important to operationalize and we decided sustainability means the ability to maintain the natural world and the species within it over a long period of time including economic, social, and environmental factors.

### **2.2 Study Design**

The design of our study was exploratory and consisted of a combination of literature review and student surveys. See Appendix A for a copy of the survey. Using more than one research tool was important for triangulation, finding an answer to our research question with two different modes. The literature review we did helped to draw what the experts were saying on the subject, to what the psychology student population at Dalhousie thought. We used apriori document analysis, knowing what themes we are looking for before beginning to review the literature. The student surveys led us to exploratory research since our sample size was not large enough to be statistically significant. The sample type we used was random sampling focused on a specific demographic. We choose random times on random days in places where we knew many psychology students would be. For example, the psychology wing of the Life Sciences Centre or the atrium and Learning Commons in the Killam Library were chosen. Sampling occurred on a Tuesday, Wednesday, Thursday, and Friday, one three hour session in the middles of each day.

We chose to use these methods because they were reliable and valid. The reliability of our research was dependent on finding psychology students and surveying them by random sampling. The validity of our research was contingent on surveying enough psychology students to get a large enough set of results. However, due to time constraints we did not get enough students to make our research valid.

### **2.3 Procedure**

Our procedure consisted of research done by examining literature from relevant sources that have looked at the sustainability of animal testing and related subjects. Next we created survey questions, aimed at psychology students, based on what we knew about the education

Dalhousie offers through animal testing. We targeted areas on campus where we knew there would be many psychology students, asked them if they were in fact psychology students and whether they would be willing to take our survey. If they were, we went through the survey with them in case they had any questions. If they did have questions, we would guide them through without showing a bias or examples for answers. Students filled out their own answers to our closed and open-ended questions. When the survey period was over, we had responses from 46 students and we compiled the answers into an Excel graph for further analysis. We then tied our results to the conclusions set out by the professionals' opinions that we had researched.

## 2.4 Limitations and Delimitations

The limitations we encountered were many. The first restriction that occurred was that the psychology department recommended we did not proceed with our initial research tool of interviewing psychology professors about their opinions on sustainability and animal testing at Dalhousie. The department stated that they had been "burned" on the issue in the past and felt we should not proceed with interviewing professors on this sensitive subject without submitting to a full university review. After we rerouted our instrumentation to surveying psychology students, there was not enough time to survey enough students from the psychology department to produce a proper statistical analysis. Our lack of time was constricted even more when group members were stopped during one of the survey sessions by a professor at Dalhousie who said they could not proceed with the session, assuming we had not completed an ethics form. Group members who were administering the survey at the time had not attended all the group meetings and therefore did not realize the ethics form had already been turned in, and so did not continue the survey session. Other problems we faced included the scope of the project as it had not yet been researched by other students in previous ENVS 3502 classes nor was there available data that was directly on the subject. As well, the project was controversial in nature and therefore there was perhaps a lack of willingness by students to participate. Our delimitations were that we only wanted to seek out the knowledge of psychology students.

## 3. Results

### 3.1 Results to Survey Questions

#### 3.1.2 Quantitative Results: Single Response Questions

In our survey we received 46 responses from psychology major students, of which 31 were female and 15 were male. In order to have a 95% confidence interval, however, we would have needed 181 students to participate, given the number of students with a psychology major at Dalhousie. Therefore, our survey is not representing the view of psychology students in general.

From our survey, the average age of our sample was 21.89 with a standard deviation of 3.47. The average year of study was 2.81 with standard deviation of 1.07.

Within our sample 33% of 1<sup>st</sup> and 2<sup>nd</sup> and 72% of 3<sup>rd</sup> and 4<sup>th</sup> year students had experienced the use of animals in classes taken.

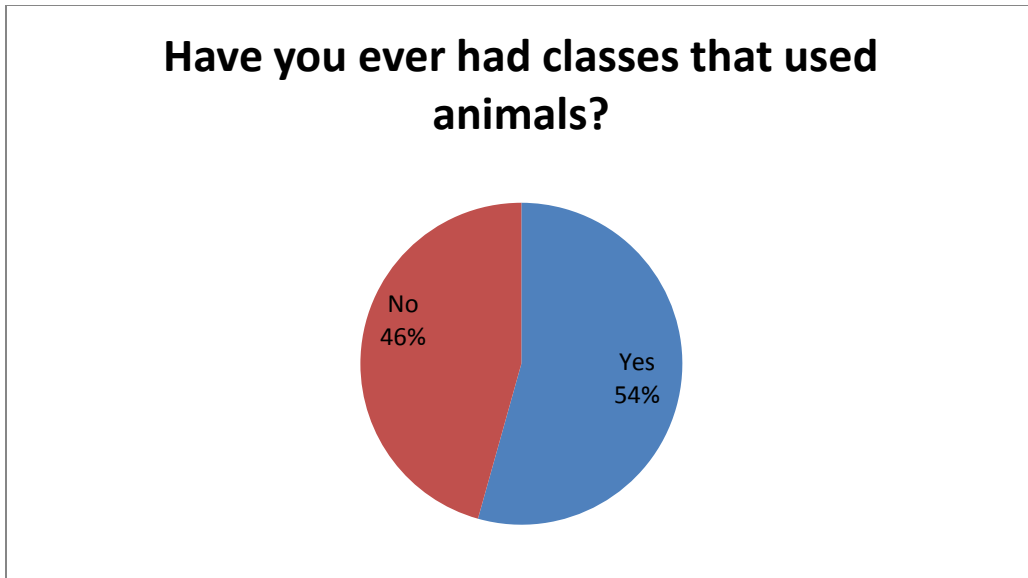


Figure 1: Percentage of students who have had classes using animals for teaching, response to question five.

Of those students who have had exposure to the use of animals in their classes 69% were involved in behavioural and 31% in physiology studies.

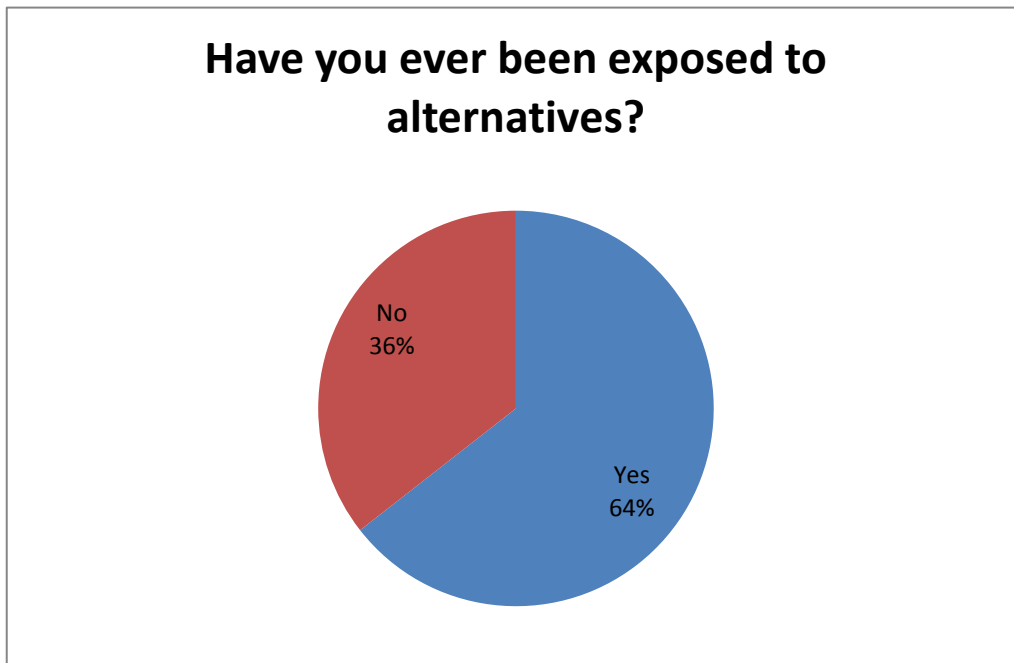


Figure 2: Percentage of students who have been exposed to alternative methods the use of real animals, response to question seven.



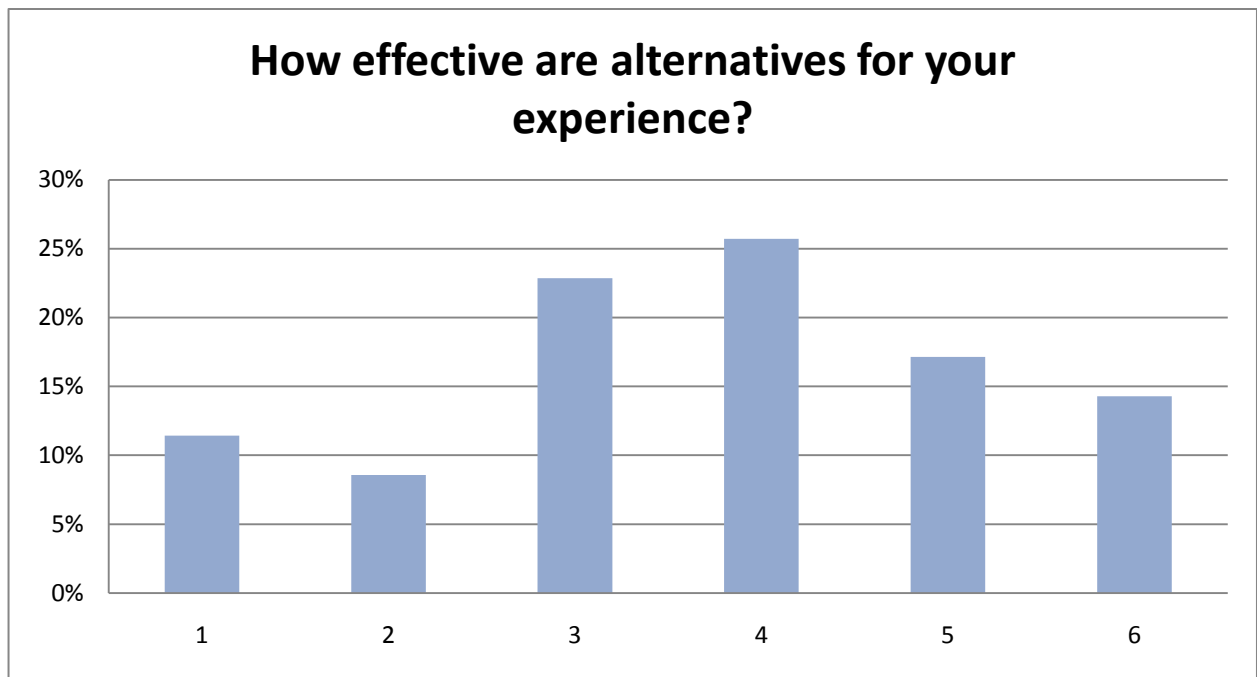


Figure 3: Students' evaluation of how effective they think alternatives are compared to using real animals, from their experience. Rating scale from 1 (least effective) to 6 (most effective), response to question 8.

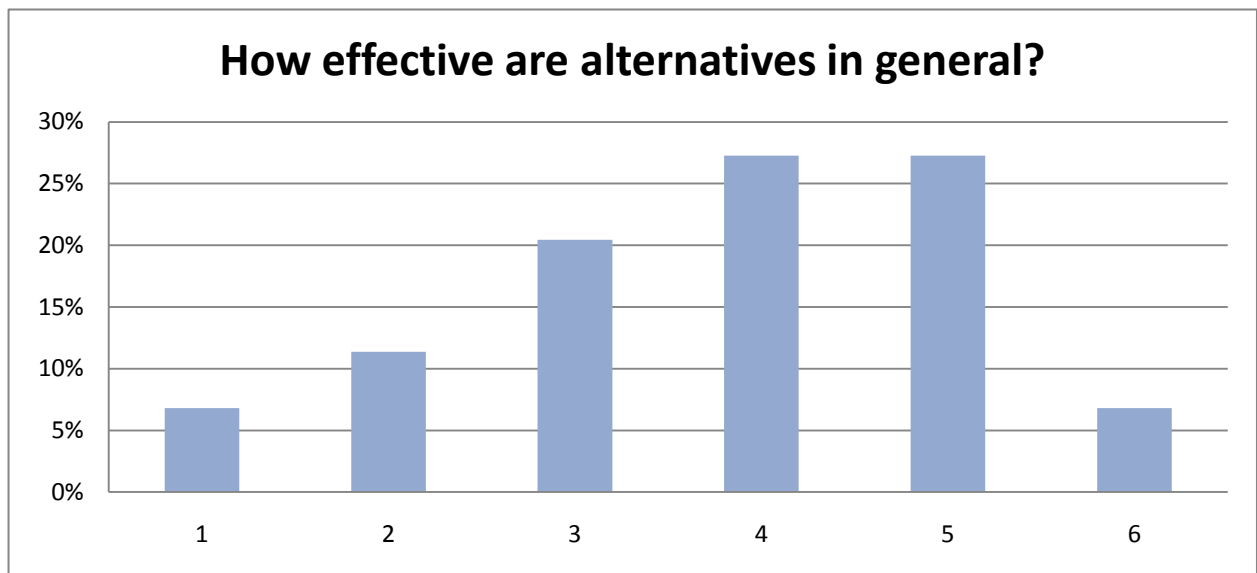


Figure 4: Students' evaluation of how effective they think alternatives are compared to using real animals, in general (i.e., not based on personal use of animals in research or teaching). Rating scale from 1 (least effective) to 6 (most effective), response to question 9.

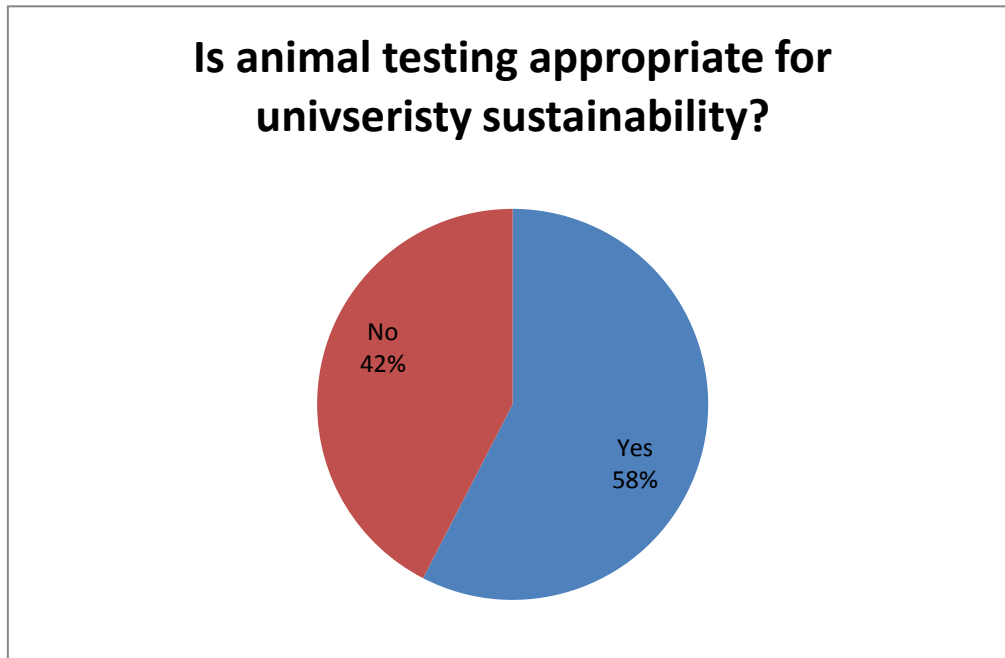


Figure 5: Response to Yes/No portion of question 12 regarding whether the use of animals for teaching an research can be considered appropriate for a university striving to be sustainable.

### 3.1.2 Qualitative Results: Written Responses

10. What do you think are the social implications of animal testing in the university?

- It makes people think it is okay when it is, sometimes, wrong
- Could affect someone's choice of going to Dalhousie
- Animal testing has contributed to medical knowledge base
- Inhumane/cruelty/immoral
- Helps society understand and research problems that affect humans
- Pharmacy and medicine use animal testing to improve products which improve standard of living
- Central nervous system is required for psych research, computer will not do, allowing a broadening of knowledge
- How else can you learn?
- New technology should replace animal testing
- Students refuse to take certain courses due to lack of alternatives
- Animals can get hurt which may mean a bad reputation for Dalhousie
- Lack of information available (when, where, how it is done)
- Good hands on experiences
- Animal rights violation
- Teaches students the experiment on animal is okay because of "the greater good"
- Should not be used if alternatives are available
- Causing conflicts between supporters and non-supporters

- No social implications so long as alternatives are deemed unsatisfactory for rigorous science and sufficient care is taken to ensure minimal animal suffering - and that suffering is balanced against scientific need.
- A public not educated on the importance of access to animal testing may frown on their use.
- Animal cruelty can be an issue, however, it can lead to new discoveries that can be applied to humans.

11. What do you think are the environmental implications of animal testing in the university?

- Improper disposal/ unnecessary wastes being generated
- Taking animal out of their natural habitat will break the balance of ecosystems
- Can affect a population of species
- Animals are removed from their environment
- Energy that is required to sustain those animals
- Transportation/preservative/storage/food
- No implications so long as precautions are taken to ensure genetically modified strains do not escape.
- Lowering the use of wild animals would reduce the impact.
- “You need to break an egg to make an omelette”
- Negative effects are very minor compared to the potential benefits of science.
- Could affect ecosystem if keystone species are targeted.

12. Sustainability can be defined as the ability to maintain the natural world and the species within it over a long period of time. Dalhousie has committed itself to becoming a more sustainable university by the signing of various international declarations. Do you think the use of animals for teaching and research can be considered appropriate for a university striving to be sustainable?

Yes       No

Please explain.

- Yes: Lab bred animals can theoretically have zero impact on wild species/habitats.
- Yes: Research looking into endangered species could have positive effects.
- No: Dalhousie should be sustainable in all facets.
- Yes: Dalhousie breeds its own animals and it is all for learning.
- Yes: Animal testing can lead to new discoveries that can help humans and other animals to live better, more fulfilled lives.

## **3.2 Literature Review**

### **3.2.1 Benefits of Animal Testing**

“The benefits provide the justification for the research that led to them” (Royal Society 2002).

#### *3.2.1.1 Social*

Supporters for animal testing argue that research is justified because it assists in discovering new ways to help people and other animals for the future and other testing techniques are not advanced enough.

Through different articles the view was expressed that animal testing is greatly beneficial due to the achievements testing on animals has made for medicine. Through the literature review we analyzed the Royal Society’s article on the research of animals. The Royal Society is a learned society for science in London, England, where research and discussion takes place. The society feels “everybody has benefited immensely from scientific research involving animals and that virtually every medical achievement in the past century has depended directly or indirectly from this type of work” (Royal Society, 2002). Though it is essential for them to only use animals when no other alternative exists, the society feels they are necessary for medical achievements. Whether it is for finding new antibiotics or treatments for cancer, animal testing has been used. The Royal Society feels using animal testing reduces human suffering and is therefore justifiable. Trials for drugs are necessary to test on animals to discover if drugs are safe for humans. Animal testing generates valuable information about how new drugs react inside a living body. Therefore the royal society feels animal testing is necessary for the well-being of society (Royal Society, 2002). The UCLA, as mentioned in the introduction, holds similar views that animal testing is not only critical but that essentially all medical breakthroughs have depended on testing on animals.

#### *3.2.1.2 Economic*

Using animals for testing often occurs for the cosmetic industry. Literature review on articles about cosmetic animal testing show the cosmetic industry is based on making money and therefore using animal testing in the cosmetic industry can emit economical benefits. If industries use testing they can prove a product does not harm eyes and skin. They can test for overall toxicity and mutagenic effects. If the product is testing as completely safe, consumers can be willing to purchase them, and increase the profit for cosmetic industry. Cosmetics must undergo testing before they can be sold therefore many companies use animals for testing and can then sell their products. Cosmetic animal testing enables companies to maintain a competitive edge over other companies since consumers put pressure on companies to offer safe products (ClearLead, n.d.).

Economic benefits also exist for medical industries that gain money from testing on animals since the testing proves their product works. Medical discoveries are extremely important and testing on animals is way more inexpensive and economical then testing on humans. Testing on humans is not only expensive but time-consuming. There is great economic interest in preservation of animal testing (Anderegg et al., 2006).

### *3.2.1.3 Environmental*

Through different articles the view was expressed that animal testing actually helps for testing whether products are environmentally friendly. For the literature review we analyzed the Canadian Environmental Protection Act of 1999 (CEPA) which is an act that promotes pollution prevention in Canada and protects the environment and human health in order to contribute to sustainable development. The act recognizes the protection of the environment is essential to increasing the well-being of Canadians. In this act the government of Canada acknowledges the need to virtually eliminate the most persistent and toxic substances. Duties in this act include assessment of toxic substances, which pose the greatest human health or environmental risks (Environment Canada, 2006). The government of Canada recognizes that assessing these substances likely must involve extensive animal testing (Animal Alliance, n.d.) Characterizing these substances requires prioritized animal testing (Environment Canada, 2006). In addition new substances which are new chemicals entering Canada must be assessed for potential environmental and health impacts, which currently include animal poisoning tests (Animal Alliance, n.d.). These include tests for birth defects, skin irritation, allergies, toxicity and more (Animal Alliance, n.d.). The Canadian Government recognizes that these tests on animals will ultimately allow regulations to prevent toxic substances from affecting the environment and Canada.

CEPA states that “The government of Canada will continue to demonstrate national leadership in establishing environmental standards,” (Environment Canada 2006). The standard the Government of Canada sets for protection of the environment includes animal testing. Therefore the government recognizes themselves as an environmental leader and feels protecting the environment and humans must include testing on animals. In order to fully protect the environment the government of Canada feels animal testing is positive and therefore good for the environment.

In addition, views from Shell Canada stated that animals are needed to test the safety of their oil and chemical products. Shell aims for limiting the number of animal testing, making them humane and looking for alternative methods but still does believe some animal testing is necessary (Shell, n.d.).

Shell feels, all responsible businesses have to ensure that their products are safe for their employees, customers, the wider public and the environment. New product developments have delivered many benefits to society, but they must be demonstrated to be safe. In the case of oil and chemical products, the use of animals for testing is required where there is no other way of establishing their safety. Although new testing methods have significantly reduced the number of animals used, animals are still needed for some safety testing. Alternative techniques, such as the use of tissue cultures, are used where possible, but these methods cannot yet establish safety in all cases. For example, animals are needed to examine possible effects occurring in the whole mammalian body where complex interactions occur which cannot be seen in isolated cells or cultures.

There are laws and regulations relating to the safety of oil and chemical products which exist to protect both people and the environment. Some regulations require tests to be carried out before materials are approved for use. Tests include testing new products, applying new scientific knowledge to existing products and addressing societal concerns about possible long-

term effects. In order to effectively address these concerns and test oil and chemical products as safe for people and the environment, animals are tested on. Therefore Shell feels animal testing is good for the environment and helps products be sustainable. Shell feels involving the use of animals in these tests is the only way to meet safety criteria. Tests commissioned by Shell mainly use laboratory-bred rats, mice and fish. Shell excuses their testing on animals for safety for humans and the environment placing humans in to priority (Shell, n.d). Shell feels exploiting other animals to advance human-self interests is necessary.

### 3.2.2 Drawbacks of Animal Testing

For the drawbacks of animal testing several experts on the subject of animal testing, human environmental effects, anthropocentrism, and other ethical and environmental issues were reviewed. These included researchers, professors, doctors, philosophers, and other authors.

#### 3.2.2.1 *Social Considerations*

Analysing literature written by Peter Singer (1975) found that he speaks of the equality of consideration. Many of his ideas base on ethical arguments and a moral expansion of our consideration towards other animals. Liberation for animals, from his point of view, also means liberation for people. He states that all people in our society are speciesists for they allow the continued use of other animals for their own benefit. Singer and others compare this type of behaviour to the freedom of women and other early human rights movements, situations in which liberation required a new scope of perspective. They discuss the social phenomenon arising by letting the most vulnerable and defenceless members of our society be cruelly treated. The testing and research conducted by Dalhousie faculty includes but also goes beyond that justified as medical progress (see, for example, Hoshooley, Phillmore, Sherry, & MacDougall-Shackleton (2007) and Mashoodh, Sinal, & Perrot-Sinal, 2009)).

Singer (1975) writes that irrational arguments are used to support our trends and societal norms. Some researchers justify their use of animals on the grounds of a lesser mental capacity in other animals. Singer refutes this argument by giving examples of animals which have a higher cognitive ability than infants and those mentally disabled, yet the social norm is to test on the nonhuman individuals. The argument that other animals do not feel pain is also used. Singer again refutes this by citing numerous examples in which evidence of emotional and physical pain is quite evident.

Funding and support behind the experiments being conducted may also have social implications. Among the funders of Dalhousie experiments were the Medical Research Council of Canada (Allen, 2001), Canadian Institutes for Health Research (Meinertzhagen, 2008), the Nova Scotia Health Research Foundation (Perrot-Sinal, 2009), and the Natural Sciences and Engineering Research Council of Canada (Brown, 2007).

Social problems stemming from corporate ownership are prominent in our society (Achbar et al., 2003). Acting as mighty individuals, with an immense power to lobby and distribute propaganda, they can have a large effect on society, becoming more powerful than, and integrated into, governments (see for example Leonard (2007)). There is also decreased transparency that comes from such large organizations.

Scientific methods of reporting establish a sense of elitism within the scientific community, one of the problems of this being that researchers are only truly open to criticism coming from within the community or those using its methods (Capra, 1989 and Greek & Greek, 2000). This phenomenon is examined by Capra (1989) through interviews with individuals such as E.F. Schumacher. Singer (1975) also writes that published reports are favourable towards the experimenter, in the case of animal research, since only observations which the researchers feel are directly important to the experiment are reported. Any suffering by the test subject a researcher believes to be irrelevant to the experiment is not reported. Journal articles are often the only means by which individuals outside of the laboratory are allowed insight into experiments to witness for themselves the use of animals, separating the funding from the research.

The funding public is manipulated into thinking that any testing with the heading “medical” is justifiable (Singer, 1975) and much faith and power is put by our society into an enormous medical industry (Strand, 2003). Hundreds of thousands of people die each year as a direct result of prescription drugs (Strand, 2003) and despite our huge investments into research, disease rates are steadily climbing (Greek & Greek, 2000). The recent documentary “The Beautiful Truth” as well as writers and doctors such as Bruker (1990), examine how the medical industry tries to silence and exterminate those who speak out against and offer alternative methods to conventional practices. Alternative remedies to health problems, mental and physical health being closely associated, are suppressed and are not validated by conventional practitioners. Individual doctors may not wish to cause harm but the system in which they have been raised has taught them with its faulty methods. Several writers establish that society is at the hands of a medical and pharmaceutical industry not set on healing but on making money.

Methods used by professors and the way material is taught will influence students (Singer, 1975). If choices are not explored this will result in a single-minded approach to research. Dalhousie is currently working on expanding its teaching methods through efforts such as the new College of Sustainability. The College has established a plan with direction to accomplish sustainable results throughout the campus (College of Sustainability, 2010). Through a repetitious process involving quantitative and qualitative data, the university is addressing problems throughout the entire institution. The plan looks at problems that are related to sustainability in respect to topics that include environmental, economic, health and social impacts. The University is also incorporating the attitude of sustainability through other societies such as the Environmental Health and Safety Office and the Organization Wellness Coordinator. How effective these methods are at affecting departments using animal testing that pass down their own methods to the next generations of scientists will remain to be seen.

### *3.2.2.2 Economic Considerations*

Greek & Greek (2000) discuss the inaccuracies involved with animal testing conducted by publicly funded researchers, most advances in the development of drugs and technologies not relying on animal testing but coming from clinical observations on humans. They state the “Why?” then of animal research is discovered by tracing the funds of animal research. At Dalhousie this involves organizations such as the Canadian Institutes for Health Research (Meinertzhagen, 2008), the Nova Scotia Health Research Foundation (Perrot-Sinal, 2009), and the Natural Sciences and Engineering Research Council of Canada (Brown, 2007).

The mandate of the Nova Scotia Health Research Foundation (NSHRF) includes the goal of increasing public awareness of the foundation and its benefits. It is funded by the government of Nova Scotia, public money being devoted to research. The decision as to where grants go is governed by a board of directors currently made up of seven nonelected members (NSHRF, 2010).

Strand (2003) discusses the economic costs of a system not devoted to truly increasing the health of individuals. Faulty methods and medications cost individuals and governments more and more money, billions of dollars being spent year after year on public health care. Despite our investments into new research expenditures on health care have risen dramatically for both total and per capita spending (CIHI, 2009). Expenditures in 2008 topped \$178 billion and are expected to increase. Expenditure in 2000 was below \$100 billion.

### *3.2.2.3 Environmental Considerations*

Several writers have argued that our anthropocentric approach to the world has led to the ecological crisis in which we find ourselves. White (1967) discusses how our current world view is based upon beliefs carried down from centuries ago, mainly in Judeo-Christian religions and those affected by them. These hold the notion that man is above all other species on Earth and that humans may do with other animals as they wish. Besides meaning disrespect for other animals, White states this world view also supports the position that humans are above all other species and that the environment is at our disposal.

Taylor (1981) states “it is the good (well-being, welfare) of individual organisms, considered as entities having inherent worth, that determines our moral relations with the Earth’s wild communities of life” (p. 83). How we treat individual organisms reflects our stance towards all communities of life. By participating in cruelty to animals we maintain the stance our society has towards other living and nonhuman systems. Many of Taylor’s other arguments are based on moral obligations to protecting animals or promoting their good for their own sake but also that humans would do well to better understand their role within Earth’s community of life.

Leopold (1949) and Carson (1962) discuss an interconnectedness that often goes unappreciated by modern methods. Ecology has taught us about the connection which exists at some level between all things, living and nonliving, on Earth. Although we may not be able to measure this connection directly its effects are being felt as our pressures on certain species or systems show symptoms in areas initially presumed to be unrelated.

Devall and Sessions (1985) state that our interference with the nonhuman world is excessive, this in turn contributing to the problems we face today. Our interference in natural systems, through what may be considered unnatural actions and practices, make it difficult for natural processes to continue in the way they have developed up to this point. The manipulation of these natural processes has far reaching effects, as means dependent on each other start to collapse.

The use of nonhuman animal species for testing is a form of this manipulation. The more philosophical approach argues that the ignoring of individuals’ intrinsic value is in itself a process detrimental to the human condition. A scientific approach may find interconnectedness between all living things, harming one group inadvertently harming many others. Milbrath (1993) discusses how the success of our species has created unanticipated effects. These include



the extending of the human lifespan by improving public health and taking more of the biosphere for our own purposes. Unintentionally this has caused a population explosion which is now ruining the quality of life for many people, demanding even more resource input. This has caused an increased material throughput putting more stress on resource stocks and at the same time creating waste, polluting existing resources. He states that we are recklessly disturbing biospheric systems so complex that we cannot know how severe the effects of our actions will be.

## **4. Discussion**

### **4.1 Overview of Findings**

Due to the lack of existing research on the overall sustainability of nonhuman animal testing our research involved much deductive reasoning in order to extract relevant information out of the existing literature related to the subject.

The findings themselves require various truths to be accepted or stances to be taken. Some of these points overlap and are a part of each other. The theme of humans being apart or interconnected with the rest of the world plays within all of these points.

- 1 Greater scientific understanding and the medical industry overall are bettering society and the environmental condition.
  - Greater scientific understanding and the medical industry are in fact sincerely working to better the health of individuals. Individuals are truly being cured of their ailments and the individual human condition is improving, not getting worse.
  - Greater scientific understanding and the medical industry are in fact sincerely working to better the human condition. Increased global suffering is due to a shortage of resources that would allow the treatment of all people.
- 2 Greater scientific understanding and the medical industry overall is not bettering society or the environmental condition.
  - Treatments are thought to be effective for the individual but are not beneficial to society. Individuals may be helped but the result is more healing needed for others. Several individuals benefit at the cost of others leading to an overall decrease in health
  - Treatments overall are inherently ineffective both for individuals and the greater environment.
    - This may be by purposeful design: The industry has no intent of bettering human condition as it is not profitable.
    - Flaws inherent in the system: the larger scope of the problems is overlooked making true bettering impossible as problems loop back to become even greater problems. Although individuals in the industry and/or system are sincerely concerned with healing their teaching and upbringing makes this impossible.

### **4.2 Survey Discussion**

While not being statistically significant the surveys were able to portray the general feeling Dalhousie Psychology major students have towards animal testing. Differing stances on

the details of implications of animal testing exist, however. For social implications, for example, the responses show that students have different thoughts about animal testing. Students may be supportive or against it, depending on the situation. A common response was that if the animal is specifically bred for the purpose of research, and if that research is used for scientific progress, the experiment is justified. In those cases students felt the benefits of those experiments outweighed the drawbacks.

Our findings show that psychology students are in fact aware of alternatives and they generally feel that alternatives can be used for teaching. Therefore, there is potential for the use of alternatives at Dalhousie. More research at the university could focus on improving these alternatives, addressing issues of scope or reliability students may have with alternative methods. Alternative methods are more viable for different subjects and different course levels. Some students expressed that the use of alternatives would be more viable for first year courses, the use of real animals for the hands-on experience apparently being necessary in upper level courses. Animal testing will be relevant as long as alternatives are not perfect. As a result, investigating better alternatives can help minimize the use of animals for testing while still achieving scientific progress and effective teaching, if that is to remain the goal of the university. While alternatives have not been perfect and the use of animals may still be relevant to certain procedures, we suggest a precautionary approach to the use of animals to prevent further future complications already being expressed.

Some applications of the precautionary principle could include stricter guidelines as to what is perceived as a necessary experiment by the approval process of the UCLA for using animals, encourage the use of alternative software to replace using animal in teaching such as from the extensive lists provided by Jukes and Chiulia (2003), or otherwise completely re-examine the purpose and structure of the experiment.

#### **4.3 Further Discussion – What do the findings mean?**

Animal testing is a symptom of a system ineffective at providing a good quality of life for all its members. The large increases in medical spending year after year, documented by the CIHI, speak to this. It may seem like we are continually trying to come up with ways to make an impossible lifestyle possible. Many more such symptoms exist, a lack of transparency and willingness to share information being another example. Animal testing may in itself be considered unsustainable from the point of view of individual experiments. Issues arising here include the waste produced by each experiment and the energy required to breed animals. The point of view expressed here is more concerned with the social mind-set resulting from testing and what this means for sustainability. The scope of this is broader and more difficult to trace and prove, evidence not being considered pure empirical data by all. Government's continued investment into medical procedures such as mass vaccinations speaks to this.

Students' general perception that animal testing is not only justified but in fact necessary for humanity's progress raises further questions. The general perception that more scientific progress leads to a greater quality of life is refuted by Milbrath's (1993) argument that despite and because of our improved public health the quality of life has dramatically decreased for many people. The overwhelming written responses of students pointing towards the great medical benefits as a result of animal tests conflict with the ideas of Greek and Greek (2000) who say that truly innovative medical innovations are not a result of animal tests but come from clinical

observations of patients by doctors, animal experiments being used after the fact to validate aspects of findings. Regardless of the effectiveness of individual experiments Kroschel (2008), Singer (1975), Strand (2003), and others cited in this paper portray the overall ineffectiveness of the medical industry and its resistance to effective methods. What is striking is that authors and doctors, including Carson (1962) and Bruker (1990), suggest methods towards environmental and human health that are much simpler while at the same time revering the complexity of natural systems. The strategies of drug testing such as those proposed by the Royal Society are much more complex, and therefore more expensive, in the making. At the same time they are, in comparison to natural systems, much simpler. Leopold (1949) and Carson (1962) show the dangers of assuming natural processes are simple and can be changed through relatively simple means.

Our research discovered that this issue can go far beyond the scope of this project, each facet of animal testing considered (i.e., the social, economic, and environmental aspects) being part of its own investigation. The overall result would be based on how one sees conditions to be developing. This makes it unclear whether our hypothesis was correct or not. The surveys conducted did show that students support the use of animals for research and teaching. However, the literature reviews both supported and refuted student views. Our view is that although huge progress has been made in many aspects of the human condition this progress is itself subject to interpretation. Given the scale of issues faced by humans today it seems that our condition is getting worse, however, and our efforts to improve are undermined by the flawed order which brought us to this problematic position in the first place. If we are to assume that the overall condition of humans and our environment has in fact gotten worse and has become unsustainable, that conventional scientific exploration has in large part contributed to the extent of this condition, and that scientific research through the use of animals has had widespread impacts, whether they be considered benefits or detriments, then we can indeed say that the use of nonhuman animals for testing is not a sustainable undertaking.

This would require Dalhousie to take a serious consideration of what sustainability means to it as a university. The Talloires and Halifax Declarations leave much room for interpretation and Dalhousie and the greater society it represents and is part of may not remain unscathed if the university integrates its definitions of sustainability with the status quo.

## **5. Conclusion**

In light of the extent of literature findings showing that animal testing is not sustainable it would be in Dalhousie's interest to implement the use of alternatives to conventional methods. A precautionary approach to the use of animals for research and teaching would be advisable so long as the deeper reasons behind global and local environmental degradation are still either unknown or not accepted by researchers and students. Further investigation of the methods, motives, and backgrounds of industries standing behind the research done at Dalhousie are also recommended. To the University Committee on Laboratory Animals and the Canadian Council on Animal Care we recommend investigation on the ethics and implications of animal testing beyond that of individual animal welfare. Through such an approach the broader significance of animal testing and what it means for the quality of life of society may be more strongly addressed.

This report was a more exploratory undertaking into the sustainability of animal testing and left many questions unanswered. There are several recommendations for future research. These include

- Professors' opinions on the sustainability of animal testing
- Student sampling with statistical significance
- The sustainability of animal testing in other departments
- Environmental responsibility of sources of funding for Dalhousie experiments

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## Appendix A

### Exploratory Research: Student Survey Questions

1. What is your major?
2. What year of study are you in?
3. What is your gender?      Male    Female
4. How old are you?
5. Have you ever had classes associated with your major that used animals (dead or alive)?  
    \_\_\_ Yes            \_\_\_ No
6. If yes, in what capacity?  
    \_\_\_ Behavioural studies      \_\_\_ Physiology      \_\_\_ Other    purpose.    Specify  
    \_\_\_\_\_
7. Have you ever had exposure to alternatives to animal use in the classroom (for example software that simulates dissection)?  
    \_\_\_ Yes            \_\_\_ No
8. On a scale of one to six, in your opinion, how effective are alternatives in place of real animal use  
    (if applicable) for your personal experience?  
    \_\_\_ 1    \_\_\_ 2    \_\_\_ 3    \_\_\_ 4    \_\_\_ 5    \_\_\_ 6
9. On a scale of one to six, in your opinion, how effective do you think alternatives are in place of real animal use, in general?  
    \_\_\_ 1    \_\_\_ 2    \_\_\_ 3    \_\_\_ 4    \_\_\_ 5    \_\_\_ 6
10. What do you think are the social implications of animal testing in the university?
11. What do you think are the environmental implications of animal testing in the university?
12. Sustainability can be defined as the ability to maintain the natural world and the species within it over a long period of time. Dalhousie has committed itself to becoming a more sustainable university by the signing of various international declarations. Do you think the use of animals for teaching and research can be considered appropriate for a university striving to be sustainable?  
    \_\_\_ Yes            \_\_\_ No

Please explain.