



Use of Animals in Research

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Policy Section:	4.1 Youth Science & Technology Research – Ethics
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Contact:	National Judge-in-Chief

1 Introduction

- 1.1 Gaining an understanding, and contributing to the knowledge, of living processes motivates a relatively large number of students to engage in inquiry-based, project-oriented studies involving biological experimentation with animals. Such studies provide an opportunity to lead students to respect all living things and to educate students on the laws, regulations, and procedures that govern experimental research involving animals.
- 1.2 Student investigations of biological processes are subject to the prevailing provincial and federal laws, ethics, and regulations, as well as to Youth Science Canada policies and regulations.
- 1.3 All aspects of a project involving biological experimentation with animals must be within the comprehension and capabilities of the student undertaking the study.

2 Canadian Council on Animal Care (CCAC) Guidelines

- 2.1 The use of animals in experimental research and the associated care of animals in Canada is subject to the requirements of the Canadian Council on Animal Care (CCAC), a national, peer review organization founded in Ottawa in 1968¹.
- 2.2 Mandate: The purpose of the Canadian Council on Animal Care is to act in the interests of the people of Canada to ensure through programs of education, assessment and persuasion that the use of animals, where necessary, for research, teaching and testing employs optimal physical and psychological care according to acceptable scientific standards, and to promote an increased level of knowledge, awareness and sensitivity to relevant ethical principles. (CCAC)²
- 2.3 The following excerpts from the Council's documentation outline the ethics of animal experimentation in Canada and, in particular, the role of Youth Science Canada in regulating pre-university animal research. Detailed information may be obtained from the CCAC web site – <http://www.ccac.ca>.
 - i) Ethics of Animal Investigation
 - (a) The use of animals in research, teaching, and testing is acceptable ONLY if it promises to contribute to understanding of fundamental biological principles, or to

the development of knowledge that can reasonably be expected to benefit humans or animals. Animals should be used only if the researcher's best efforts to find an alternative have failed. A continuing sharing of knowledge, review of the literature, and adherence to the Russell-Burch "3R" tenet of "Replacement, Reduction and Refinement" are also requisites. Those using animals should employ the most humane methods on the smallest number of appropriate animals required to obtain valid information.³

ii) Pre-University Use of Animals

- (a) Animal use in the school is subject to the requirements of legislation such as the Health of Animals Act (Bill C_66), the Criminal Code of Canada, Section 446, Cruelty to Animals, and provincial legislation, where such exists.
- (b) Primary responsibility for animal use at the pre-university level now lies, however, with Youth Science Canada, which requires compliance with the CCAC guidelines in the conduct of biological research, and regulates animal experimentation in Science Fairs and related or other events under its auspices. All research intended for Science Fairs must be screened by a committee cognizant of current requirements.⁴

3 Russell-Burch 3R Tenet - Replacement, Reduction and Refinement

3.1 In 1954, William Russell, a brilliant young zoologist who happened to be also a psychologist and a classical scholar, and Rex Burch, a microbiologist, inaugurated a systematic study of laboratory techniques in their ethical aspect. This led to publication in 1959 of *The Principles of Humane Experimental Technique*, in which they classified humane techniques under the headings of Replacement, Reduction, and Refinement - now commonly known as the three Rs. In some ways this elegant classification was 25 years ahead of its time. Today the three R's are widely used by all responsible scientists and one hardly ever reads or hears a discussion on laboratory animal welfare that does not refer to them. The complete text of the book is available online⁵

- i) Reduction is a concept that covers any strategy that will result in fewer animals being used to obtain the same amount of information, or in maximizing the information obtained per animal and thus limiting or avoiding the subsequent use of additional animals.
- ii) Refinement signifies the modification of any procedures that operate from the time a laboratory animal is born until its death, so as to minimize the pain and distress experienced by the animal, and to enhance its well being.
- iii) Replacement refers to any experimental system that does not entail the use of a whole, living animal.

4 Definitions of Student Researcher, Adult Supervisor and Scientific Supervisor

4.1 A *Student Researcher* is the person primarily responsible for the project. This student makes observations, takes appropriate data, and analyses it to draw conclusions.

4.2 The *Adult Supervisor*, a parent, teacher, professor or scientist, is responsible for ensuring that the student is aware of the ethical issues involved in the project and provides guidance and advice to ensure that Youth Science Canada policy is followed. The Adult Supervisor is responsible for ensuring that the student's research is eligible for entry into the CWSF and related or other events sponsored by Youth Science Canada. Every project involving the participation of humans or the use of animals requires an Adult Supervisor.

- 4.3 The *Scientific Supervisor*, who will usually have an advanced degree, is involved in a complex project involving animals, which often takes place in a university, institutional, industrial or government laboratory. The Scientific Supervisor is responsible for ensuring that (a) all provincial and federal laws governing safety, handling of materials, and procedures are followed; (b) all applicable policies concerning research ethics and the use of animals are known to the student and adult supervisor, and are followed. The Scientific Supervisor may be the Adult Supervisor.

5 Ethics Review Requirements

- 5.1 Youth Science Canada requires that all research involving animals entered in the Canada-Wide Science Fair, a Youth Science Canada affiliated Regional Science Fair, or related or other event under its auspices, comply with the CCAC guidelines in the conduct of biological research.
- 5.2 This policy applies to every project that involves vertebrates or Cephalopods.
- 5.3 For complex projects, often carried out in a research laboratory licensed to do such studies, the ethics review process must involve (i) the student's Scientific Supervisor, who will usually be a staff member at the laboratory, and (ii) a member of the Ethics Committee of the Regional Science Fair. This will provide the student researcher with an appreciation of the requirements and safeguards existing in law regarding experimentation involving animals. Projects carried out in a licensed research laboratory must have the approval of the committee charged with approving such projects within the institution, e.g. the Scientific Review Committee (SRC). The rules of the research institution may be more stringent than the rules given here, and must be followed. Projects may also be referred to the Youth Science Canada Ethics Committee. Students and their supervisors involved in projects that use vertebrates or Cephalopods must follow the process described in Section 8.
- 5.4 Laboratories licensed to do studies that involve the use of animals include university, hospital, institutional, industrial or government laboratories.
- 5.5 Form 4.1C - Animals Approval Form – must be submitted to the Canada-Wide Science Fair at registration for any project involving the use of animals.

6 Use of Animals in Projects

- 6.1 All projects at science fairs involving animals must have scientific merit, have educational value, and avoid gratuitous harm.
- 6.2 The Adult Supervisor is responsible for ensuring the safe and ethical conduct of projects involving the use of animals. Youth Science Canada strongly recommends that a Regional Science Fair Ethics Committee review all proposed research involving animals **before experimentation is started**. Projects involving animals, whether vertebrate or invertebrate, which are deemed to be unethical, may be disqualified.
- 6.3 Young scientists or their supervisors unsure about the acceptability of a proposed project must contact their Regional Science Fair, who can access appropriate authorities familiar with current regulations and with relevant aspects regarding scientific merit, and for guidance and suggestions in performing the work.

7 Invertebrate Animals

Lower orders of life - bacteria, fungi, protozoa, insects, plants and invertebrate animals with elementary nervous systems - can be used in experimentation to reveal valuable

basic biological information. Except for the Cephalopods, e.g. squid, octopus or cuttlefish, invertebrates have small nervous systems, consisting of many small brains (ganglia). Students may do experiments on such invertebrate animals, and exhibit their work in science fairs. Cephalopods have a large, vertebrate-like central nervous system and are treated according to the rules for Vertebrate Animals.

Youth Science Canada reserves the right to disallow a project involving experimentation on invertebrates that is of questionable scientific or educational value, or is judged to be unethical.

8 Vertebrate Animals and Cephalopods

8.1 Vertebrate animals, (i.e. fish, amphibians, reptiles, birds, and mammals,) and Cephalopods (e.g. the squid, octopus and cuttlefish) are not to be used in any science fair projects, with the following four exceptions:

- i) Observation of animals in zoological parks, farm animals, and pets is permitted. Observation of wild animals is permitted, except for those at risk. Species listed as *Endangered, Threatened* or *of Special Concern* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) are not suitable subjects for research by science fair participants⁶. Vertebrate animals are not to be used in any active experiments which may be deleterious to the health, comfort or physical integrity of the animals.
- ii) Observation of wild animals falls within the definition of hunting in some jurisdictions. Students should obtain advice and permission from conservation authorities to ensure that they are not interfering with the animal's life, and to ensure that their project is permissible. A permit may be required.
- iii) Behavioural experiments with positive rewards are permissible only if the animal is not placed in a stress situation. Training an animal to travel through a maze to receive a food reward is allowed as long as the animal is not stressed, e.g., by withholding food well beyond normal feeding times.
- iv) Projects involving animal experimentation may be conducted under the supervision of research personnel employed by a University, Hospital, Government Organization or Agency, or Industrial Laboratory and where the animal experimentation has been pre-approved by a Scientific Review Committee (SRC) (or equivalent) in the institution employing the supervisor(s). A copy of the Letter of Approval from the SRC must be included in the documentation submitted to the Chief Judge, CWSF. All projects so approved are eligible for the Canada Wide Science Fair or other event held under the auspices of Youth Science Canada, and do not need further approval by the Ethical Committees of either the Regional Science Fair or Youth Science Canada.

There is one exception to this section. Student researchers may not pursue a project that leads directly to the death of a vertebrate animal. Consult the Youth Science Canada Ethics Committee web page for a detailed discussion. Student researchers are prohibited from performing euthanasia; only the Qualified Scientist or an institutional representative may perform the euthanasia. All methods of euthanasia must adhere to current CCAC Guidelines.

8.2 Experiments on embryos are subject to the same rules that apply to the animal producing the embryos. If embryos are incubated until the end of the gestation period, the offspring must be reared normally. Otherwise all embryos must be destroyed by freezing or other approved methods before 85% of the normal incubation.

- 8.3 Cells and animal parts, including organs, tissues, plasma or serum may be used in science fair projects. They can be obtained only in one of three ways:
- i) from biological supply houses;
 - ii) from the research facilities at laboratory licensed to do animal studies (section 5.4);
or
 - iii) salvaged from the food industry.

Evidence of the source of the materials must be available at the project display

- 8.4 Youth Science Canada reserves the right to disallow a project involving experimentation on vertebrates (including cells, animal parts, or embryos) or cephalopods that is of questionable scientific or educational value, or is judged to be unethical.

9 Cultural Issues

- 9.1 Youth Science Canada recognizes that there are cultural communities within Canada that hold their own values, beliefs, and practices. We encourage any student or mentor from these communities to consult with the Youth Science Canada Ethics Committee who will work collaboratively, so that projects can be designed which respect both the intent of this policy on animals as well as the culture of the community.

10 Drugs

- 10.1 Definition of a “drug”: “drug” includes any substance or mixture of substances manufactured, sold, or represented for use in:
- i) the diagnosis, treatment, mitigation or prevention of a disease, disorder, abnormal physical state, or its symptoms, in humans or animals,
 - ii) restoring, correcting, or modifying organic functions in humans beings or animals,
 - iii) disinfection in premises in which food is manufactured, prepared or kept.⁷
- 10.2 Drugs may be used in any experiment exhibited at a Science Fair only if carried out in a Hospital, University, Medical or other similar Laboratory under the direction of a Scientific Supervisor. The study must be pre-approved by the appropriate Scientific Review Committee that reviews the research at the Institution, and this must be documented by a letter that forms part of the application to the School, Regional or Canada Wide Science Fair. No other studies involving the use of Drugs, as defined above by Federal Regulations, may be exhibited at any Science Fair. The rules for the use of drugs apply to vertebrates, invertebrates and embryos.

11 Principles and Guidelines for the Use of Animals in Elementary or Secondary School Education

The Institute for Laboratory Animal Research (USA) has published a pamphlet which outlines ten Principles that define the ethical use of animals in a school or science fair setting.⁸ Youth Science Canada endorses these ten principles, and all students doing a science fair project involving animals must be familiar with them.

12 Forms

All forms are available from both the Documentation section of the CWSF Registration System, and from the Ethics Committee web site: <http://www.ldstf.ca/ethics/index.html>

Form 4.1C – Animals Approval must be submitted for every project that involves vertebrates or Cephalopods, their embryos or their tissue samples.

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The definitions are in alphabetical order on this page. Look for “Drug”. Accessed 7 July 2009
- ⁸ http://dels.nas.edu/ilar_n/ilarhome/Principles_and_Guidelines.pdf
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