

Guidelines for the use of animals in research

The use of animals in research raises important ethical issues. Studies in laboratory settings necessarily involve keeping animals in cages. Manipulative procedures and surgery may be necessary to achieve the aims of the research. Observation of free-living animals in their natural habitats may involve disruption, particularly if feeding, capture or marking is involved. While the furthering of scientific knowledge is a proper aim, and may itself advance an awareness of human responsibility towards animal life, the investigator should always weigh any potential gain in knowledge against the adverse consequences for the animals used as subjects, and also for other animals in the case of field studies.

In order to help their members make what are sometimes difficult ethical judgements, the Association for the Study of Animal Behaviour and the Animal Behavior Society have formed Ethical and Animal Care committees, respectively. These committees jointly produced the following guidelines for the use of all those who are planning and conducting studies of animal behaviour. These guidelines will be used by the Editors of *Animal Behaviour*. Submitted papers that appear to violate the spirit of the guidelines will be referred to one of the committees, and the evaluation of the committee will be used by the Editor in deciding whether to accept the manuscript.

1. LEGISLATION

Investigators must abide by the spirit as well as the letter of relevant legislation. For those who reside in Great Britain, references to laws designed to protect animals are given in the Universities' Federation for Animal Welfare (U.F.A.W.) handbook (U.F.A.W. 1987). In the U.S.A., both Federal and State legislation may apply: guidance can be obtained from the Code of Federal Regulations (1979) and from the National Research Council (1985). In Canada, guidance can be obtained from the Canadian Council on Animal Care (1980–1984) publications *Guide to the Care and Use of Experimental Animals, Vols 1 and 2*. Workers elsewhere should acquaint themselves with local requirements.

2. CHOICE OF SPECIES

The species chosen for study should be well suited to answer the questions posed. When research involves

the use of procedures that are likely to cause unavoidable pain or discomfort to the animal, and when alternative species can be used, the researcher should employ the species which, in the opinion of the researcher and other qualified colleagues, is least likely to suffer. Choosing an appropriate subject usually requires knowledge of a species' natural history as well as its complexity. Knowledge of an animal's previous experience, such as whether or not it has spent a lifetime in captivity, can be of profound importance. Although not usually appropriate in studies of behaviour, alternatives to animal experiments may sometimes be possible (Smyth 1978).

3. NUMBER OF INDIVIDUALS

In laboratory studies or field studies involving manipulations potentially detrimental to the animal or the population, the researcher should use the smallest number of animals necessary and sufficient to accomplish the research goals. The number of animals used in an experiment can often be dramatically reduced by good experimental design and the use of statistical tests which enable several factors to be examined at one time. Still (1982) and Hunt (1980) discuss ways of reducing the number of animals used in experiments through alternative designs. Useful reference works are Cox (1958) and Cochran & Cox (1966).

4. PAIN OR DISCOMFORT

If procedures used in research involve pain or discomfort, the investigator must consider whether the knowledge that may be gained justifies the stress and pain inflicted on the animals. In general, researchers are urged to consider the use of alternative procedures before employing techniques that are likely to cause physical or psychological discomfort to the animal. Pain or discomfort, even when unavoidable, should be minimized to the greatest extent possible under the requirements of the experimental design. Attention should be given to proper pre- and post-operative care in order to minimize preparatory stress and residual effects. Unless specifically contraindicated by the experimental design, procedures that are likely to cause

pain or discomfort should be performed only on animals that have been adequately anaesthetized. Investigators are encouraged to discuss with colleagues both the scientific value of their research proposals and also possible ethical considerations. Colleagues who are in a different discipline are especially likely to be helpful since they may have perspectives that differ from those of the investigator.

The following more specific points may be of use.

(a) Fieldwork

Observation of free-living animals in their natural habitats may involve disruption, particularly if feeding, capture, or marking is involved. While field studies may further scientific knowledge and advance an awareness of human responsibility towards animal life, investigators should always weigh any potential gain in knowledge against the adverse consequences of disruption for the animals used as subjects and also for other animals and plants in the ecosystem. Two useful sources of information are the books edited by Stonehouse (1980) and Amlaner & Macdonald (1980).

(b) Aggression, Predation and Intraspecific Killing

The fact that the agent causing harm may be another non-human animal does not free the experimenter from the normal obligations to experimental animals. Huntingford (1984) discusses the ethical issues involved and recommends that, wherever possible, field studies of natural encounters should be used in preference to staged encounters. Where staged encounters are necessary, the use of models or alternative experimental designs should be considered, the number of subjects should be kept to the minimum needed to accomplish the experimental goals, and the experiments made as short as possible.

(c) Aversive Stimulation and Deprivation

These procedures may cause pain and distress to animals. To minimize possible suffering of the animal, the investigator should ascertain that there is no alternative way of motivating the animal, and that the levels of deprivation or aversive stimulation used are no higher than necessary to achieve the goals of the experiment. Alternatives to deprivation include the use of highly preferred foods and

other rewards which may motivate even satiated animals. Use of minimal levels requires a knowledge of the technical literature in the relevant area: quantitative studies of aversive stimulation are reviewed by Church (1971) and the behaviour of satiated animals is considered by Morgan (1974). Further comments on reducing distress due to motivational procedures are to be found in Lea (1979) and Moran (1975).

(d) Social Deprivation, Isolation and Crowding

Experimental designs that require keeping animals in over-crowded conditions, or which involve social deprivation or isolation, may be extremely stressful to the animals involved. Since the degree of stress varies considerably with the species, and with the age, sex, reproductive condition and social status of the individuals, the biology of the animals concerned and their previous social experience should be considered, and stressful situations should be avoided as much as possible.

(e) Deleterious Conditions

Studies aimed at inducing deleterious conditions in animals are sometimes performed in order to gain scientific knowledge of value to human problems. However, the humane treatment of research animals in such experiments should still be considered by the investigator. Animal models should be suitable to the problem investigated. Where feasible, studies inducing a deleterious condition in animals should also address the possible treatment, prevention or alleviation of the condition. Furthermore, if the goals of the research allow it, the investigator should consider using naturally occurring instances of such conditions in free-living or domesticated populations, as an alternative to inducing the deleterious conditions.

5. ENDANGERED SPECIES

Members of endangered or locally rare species should not be collected or manipulated in the wild except as part of a serious attempt at conservation. Information on threatened species can be obtained from the International Union for the Conservation of Nature, Species Conservation Monitoring Unit, 219C Huntingdon Road, Cambridge CB3 0DL, U.K. In the U.S.A., rules and regulations pertaining to the Endangered Species Act of 1973 may

be found in the Code of Federal Regulations (1973). Lists of endangered species can be obtained by writing to the Office for Endangered Species, U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C. 20240, or to the Committee on the Status of Endangered Wildlife in Canada, Canadian Wildlife Service, Environment Canada, Ontario, K1A 0E7. Investigators working in other countries should familiarize themselves with local information on threatened and endangered species.

6. PROCUREMENT OF ANIMALS

Animals should be obtained only from reliable sources. For workers in the U.K. advice may be obtained from the Laboratory Animal Breeder's Association, Charles River (U.K.) Ltd, Manston Research Centre, Manston Road, Margate, Kent CT9 4LP. In the U.S.A., information on licensed animal dealers can be obtained from the local office of the U.S. Department of Agriculture (U.S.D.A.). So far as is possible, the investigator should ensure that those responsible for handling the animals en route to the research facilities provide adequate food, water, ventilation and space, and do not impose undue stress. If animals are captured or killed in the wild, this should be done in as painless and humane a manner as possible.

7. HOUSING AND ANIMAL CARE

The experimenter's responsibilities extend also to the conditions under which the animals are kept when not in use. Caging conditions and husbandry practices must meet, at the very least, minimal recommended requirements. Guidance can be obtained from the U.F.A.W. (1978) handbook, from the National Research Council (1985) guide, and from the Canadian Council on Animal Care's (1980-1984) *Guide to the Care and Use of Experimental Animals*.

Although these publications provide general guidelines that can be applied to wild animals, special attention may be required to enhance the comfort and safety of wild species. Normal maintenance should incorporate, as much as possible, aspects of the natural living conditions deemed important to the welfare and survival of the animals. Consideration should be given to providing

features such as natural materials, refuges, perches, and dust and water baths. Frequency of cage cleaning should represent a compromise between the level of cleanliness necessary to prevent diseases, and the amount of stress imposed by frequent handling and exposure to unfamiliar surroundings, odours and bedding.

8. FINAL DISPOSITION OF ANIMALS

Whenever practical or feasible, researchers should attempt to distribute their animals to colleagues for further study. However, if animals are distributed for use in additional experiments, care should be taken that the same animals are not used repeatedly in experiments which involve invasive surgical procedures or other treatments that are likely to be stressful or painful. Except as prohibited by national, federal, state, provincial, or local laws, researchers may release field-trapped animals if this is practical and feasible, and if it is critical to conservation efforts. However, the researcher should consider that releases into the wild may be injurious or detrimental to existing populations in the area, and animals should be released only at the same site where they were trapped (unless conservation efforts dictate otherwise) and only when their ability to survive in nature has not been impaired, and when they do not constitute a health or ecological hazard to existing populations. If animals must be destroyed subsequent to a study, this should be done in as humane and painless a way as possible; death of the animals should be confirmed before their bodies are discarded.

These guidelines supplement but do not supersede the legal requirements in the country and/or state or province in which the work is carried out. They should not be considered an imposition upon the scientific freedom of individual researchers, but rather as helping to provide an ethical framework to which each investigator may respond in making decisions related to animal welfare.

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