

Thoughtful Use of Animals

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Introduction

As part of a symposium held in Cincinnati entitled, "Ethical Issues Related to the Use of Research Animals," I was asked by the program director to consider whether further legislation regarding the use of animals might be necessary to ensure more thoughtful use of animals at universities. The following is my response.

Change in Attitudes

Since I was a student, there have been enormous changes in attitude toward the way we use animals in biomedical research. It would be desirable to be able to attribute these changes to an increase in our sensitivity to humane values, and recognition of our responsibility to provide humane care. Although these considerations may have been the principal motivating factor for many people, much of the recent progress must be attributed to the passage of the Animal Welfare Act and its amendments. Legal responsibilities seem to have fostered moral awareness, and many constructive changes have followed. I have no proof — only a feeling — that concern for animal welfare peaked during the campus turmoils of the late 1960's and early 1970's when, at least superficially, our entire nation felt a resurgence of social conscience. Social causes were popular and it was considered very appropriate to speak out about them. While the amount of rhetoric may have declined in the last few years, I believe that there is still a broad-based and sincere interest in hu-

mane concerns. I also feel that constant monitoring and stimulation of our humane sensitivity is desirable. As a second critical factor, inflation has forced us to recognize the cost of using animals in experiments and teaching programs. Ever-increasing costs have stimulated greater scrutiny of live-animal experiments and of their role in experimental design. As a consequence of these changes, greatly improved animal care facilities and programs are a reality in most institutions. I believe that, when applied, present legislation coupled with the guidelines from NIH and ILAR is completely adequate to ensure proper usage of animals in live experiments. I further believe that future improvements must depend on changing the attitudes of individual investigators through education, and not on new legislation or spending more money.

Due, in part, to the Animal Welfare Act of 1966 and its amendment in 1977, federal, state, and private funds have been used to improve physical facilities for animal care at most of our institutions. The recognition of the need for adequate veterinary care, trained supervision, well-paid and informed animal caretakers, improved caging and management, and the sincere concern of administrators have all resulted in a dramatic improvement in the quality of animal care and physical plants. Animal health has improved as a result of better care and, most important, there has been a conscious effort to procure from breeding facilities animals that are sound and free of many diseases. In addition, there are

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new backup services on many campuses, such as diagnostic services and disease surveillance. However, animal facilities still differ among each other, and there is always room for improvement. Two areas with notable deficiencies are (1) transportation of animals, which has shown some improvement, and (2) the use of animals by investigators, which is completely dependent on the ethics and professionalism of the specific investigator.

Legislation has been used to stimulate institutions to improve their quality of animal care, but there is no way to formulate legislation to coerce changes in attitudes among individual investigators. Attitudes can only be altered through education. The important areas of animal use where differences in attitude are likely to occur are those aspects, such as experimental design, that are controlled by the investigators and teachers. These professionals provide the role models for students to follow, and their attitudes often are unconsciously adopted by these students who, in turn, later implement them in their own research or teaching. The question then becomes, "Who will teach the teachers?" and the answer may be: ourselves. Education can bring about changes in attitude where legislation cannot.

Responsibility Through Education

Most informed persons believe that the humane use of lower animals to increase our knowledge in the life sciences and to achieve practical advancements in medicine, agriculture, animal husbandry, and the development of drugs is ethical. However, to quote Dr. Bob Hummer, "This same segment of the human population would raise some questions about the ethics of the scientific community if it were aware of the inadequate orientations afforded many of the new and young investigators in the proper

care, handling and utilization of experimental animals." Of course, his statements are general, and they are especially directed toward the prevention and alleviation of pain before and after specific kinds of surgical or stress situations. But the implication of Dr. Hummer's statement is clear: there is a lack of educational guidance at the institutions that train young people to work in the life sciences. The passage of additional laws cannot provide us with the positive assurance that every experimental animal will receive compassion, concern, or even thoughtful care during experimental procedures.

I believe that in most cases, the lack of adequate care, the use of inhumane procedures, or simple callousness is a result of the investigator's ignorance or indifference, which is in turn caused by a lack of training in the broad area of animal care and surgical techniques. This lack of training may result from time demands in the curriculum, instead of any conscious setting of goals. For example, students, as they strive to absorb a large body of facts in a given time period, may find that they must devote themselves to one specific area in order to achieve mastery in their chosen discipline. This mastery is necessary for them to compete in a scientific world and, as a result, little time is allotted to training in the use of animals. Unfortunately, knowledge about using experimental animals is somewhat akin to knowledge about electronic instruments: students acquire it largely on their own. Another excuse for the relative dearth of training has been the inability — or the unwillingness — of people who do have the know-how to transmit their skills to individuals in other disciplines. I would further suggest that many curricula do not provide the channels for people who have the requisite know-how to transmit their knowledge.

The education of graduate students, in particular, has several shortcomings in regard to instruction in the use of animals. These inadequacies in graduate education can be corrected, and are being corrected; I believe this effort will result in important advancements in the quality of care afforded to the individual animal. We must convey to the student and to our colleagues our recognition that in the past animals have contributed enormously to human welfare, and that their use is a privilege, not a right. A thorough grounding in their proper treatment must be considered as a crucial prerequisite to gaining that privilege. In addition, researchers must be made aware that they need to be observant of the animals themselves and the setting in which they are held while under study; they must also give careful thought to the "why" of their experimental design and the role of animals in it. We must demonstrate that there are scientific as well as humanistic reasons for this concern. The scientific aspects deserve time in each graduate student's curriculum, because they constitute an integral part of the comprehensive knowledge that he or she must obtain in his or her discipline. No chemist would ever buy his sodium chloride from the grocery store; the chemist demands "reagent grade," and the animal component of biomedical research deserves equally sophisticated consideration.

Courses in the selection of animals, basic elements of animal care and husbandry, and experimental animal techniques should be a part of all graduate programs in biology in every institution. Many examples of this type of program are already available at medical schools; however, courses in this area are not always available at other colleges. In addition to formal courses, consultative services in animal use should be available to all investigators. Every graduate

school or professional school should also expand the scope of its human subjects and animal care committees to develop a well-qualified animal concerns and usage committee, with the specific charges listed in Table 1.

Educational Resources

Many people believe that, in our western civilization, early religious training has a profound influence on the formation of our attitudes toward animals. The Christian doctrine, which proclaims the dominion of man over animals, can of course be interpreted in many ways. While most scholars hold that the concept of dominion does not release us from moral responsibility toward other creatures, our early attitudes may be influenced by our own personal interpretation of the word "dominion." Many people have unconsciously interpreted "dominion" to mean an absolute right to use animals, without concern for their lives or suffering.

Early education can also influence later behavior and attitudes. Positive educational experiences can be provided in early school years, by such means as the Ralston Purina Company filmstrip on responsible pet care, designed specifically for use in grades 3-6. Many similar audiovisual aids such as the movie, "The Animals Are Crying," are available through humane societies. Secondary school biology projects and science fairs, however, have not always contributed to the thoughtful use of animals, nor have they reinforced concern for animal welfare. Although I am aware that significant changes have been made in guidelines for use of animals by educational institutions at all levels, many projects using animals still do not receive proper supervision and guidance. This often results in thoughtless, repetitive, and inhumane treatment to animals, in the

TABLE 1 Animal Concerns and Usage Committee Charges

1. To encourage propriety and sound judgment in the assignment of animal resources in teaching and research programs.
2. To ensure appropriate use of animals as teaching and research resources.
3. To recommend alternatives to animal use, where feasible.
4. To continually monitor animal use and recommend policies that will ensure humane care and concern by faculty, staff, and students. This committee could coordinate and ensure the development of laboratory and experimental animal courses for graduate training as previously identified.

name of science. In contrast, there are the animal care programs conducted by groups such as 4H and the Boy Scouts, which can serve to build up a sense of responsibility and understanding in the student.

Recognition of the need to improve methods of animal use and care through educational endeavors has been provided by numerous organizations. Examples of these kinds of programs have been provided by the American Association of Laboratory Animal Science (AALAS), American College of Laboratory Animal Medicine (ACLAM), and the American Association for the Accreditation of Laboratory Animal Care (AAALAC), humane societies, and medical societies. *Standards for Accreditation for Laboratory Animal Facilities*, set by AAALAC, the *Guide for Care and Use of Laboratory Animals*, prepared by the Institute of Laboratory Animal Resources, National Research Council, and supported by the Animal Resources Program Division of Research Resources, NIH, are further examples of positive efforts. These organizations directly influence the educational programs that provide the stimuli for improvement of the ways in which experimental animals are used.

Scientific publications serve to disperse information among the scientific community, but can also serve to directly influence animal experimentation,

through the wording of their guidelines for acceptance of papers. Thus, they can become one part of the educational process entailed in disseminating high standards for animal usage. Editors, referees, and staff should ensure that all contributors are made aware that a review of every paper will include a close scrutiny of adherence to the guidelines for the care of laboratory animals, while the experimental design will be examined as to the number and appropriateness of animals used. Refusal to publish results of experiments that are judged to have violated the guidelines or in which animal suffering is obvious can have a profound effect on investigators. Granting institutions are also in an excellent position to give similar instructions to applicants, through evaluations by peer review.

Another area of education that concerns all of us is communication between scientific investigators and individuals in the humane movement: each group must consider the concerns of the other. Some common misunderstandings between the two groups can be identified (Table 2). On the other hand, antivivisectionists tend to stereotype scientists with features such as those in Table 3. Most informed scientists and animal-oriented people have views that fall somewhere in between. Each side needs the other's involvement in its programs to gain new insights and an appreciation of

TABLE 2 Common Over-reactions

1. All anti-vivisectionists believe that it is unethical for humans to sacrifice lower animal life for the purposes of biomedical research.
2. The final goal of most anti-vivisectionists is the abolishment of animal research.
3. Anti-vivisectionists have no scientific understanding or insight into biomedical experiments.
4. Anti-vivisectionists are impractical and uncompromising in their demands.
5. Most anti-vivisectionists represent only the affluent class.
6. There is a bias in favor of the animals' interests over those of humans.
7. There is a distrust or fear of science and scientists.

TABLE 3 Anti-vivisectionists Stereotype the Scientist with the Following Features

1. That many or all of the experiments performed are useless.
2. That they cause unnecessary or unjustified pain.
3. That, in many cases, more animal life is sacrificed than would be necessary to achieve a stipulated result.
4. That many scientists are inhumane persons, so that society cannot rely upon the general anti-cruelty laws to control their sadistic behavior; additional legislation is necessary.



Figure 1. Phase I students during anatomy class. Working with living animals is not only relevant to teaching in clinical medicine, but also instills concern for animals and promotes proper handling and care.

the total problem. Mr. Roger Caras, in his keynote speech at the meeting of The Humane Society of the United States, San Diego, California, October 1977, remarked on the lack of trust between colleges of veterinary medicine and humane societies on the issue of the ethical use of animals, and that both groups should try to formulate a sensible approach, since all share a common goal. He suggested, for example, that the humane societies should become involved in selecting course content. In other words, they should become a part of the educational process so that veterinary students will come out of school "not thinking of us [the humane movement] as an enemy, but rather as an ally."

At the present time, this kind of involvement is operating in the other direction. Many humane societies, animal control groups, etc., include veterinarians, physicians, and other professionals in their efforts to better the understanding of people and animals. To quote another statement by Mr. Caras, "Many educators in this country still think of the humane movement as singularly and universally anti-vivisectionist, impractical, opposed to all aspects of wildlife management, and hostile to all biologists, doctors, and other scientists. They think of us as immovable. They are afraid to be associated with us."

The most forward step that could be made in the educational process is the stimulation of the type of communication that will allow all of us to appreciate that we do have a common goal, that of ensuring the health of all creatures by relieving suffering, pain, and fear. To cite one example, finding solutions to the skyrocketing overpopulation of unwanted pets is one problem shared by all of us. We also need to work together to provide educational programs for training science fair participants (both students and teachers), an-

imal control personnel, and other community projects related to animal care. Another element in this sort of dialogue is informing the public about how scientific knowledge is developed and the gains that can be reasonably expected from science. It is particularly important that the public realize that the value of experiments cannot always be estimated before they are performed.

Veterinary Medical Education

Education in the respect for all animals starts with early influences, and never ends. Individual ethical values are largely determined by family influences and early childhood experiences which are, in turn, dependent upon cultural and religious forces. Professional development and the acquisition of moral values from educational experiences at professional schools are built on these early foundations. In reference to professional ethics, it has been generally presumed that the professionals themselves are in the best position to make such judgments and ascertain that members fulfill their obligations to the profession. However, given the complexity of today's knowledge, the need for specialized educational resources is clearly evident. I believe that we have an additional obligation relative to the humane education of those investigators who use animals. Through the generous contribution of the Merck, Sharp, and Dohme Company, the College of Veterinary Medicine, University of Tennessee, has such a program.

There are strong arguments for using animals in a veterinary teaching program, and I believe that their continued use is necessary (Fig. 1). Perhaps it would be best to start by citing some of the accusations that have been made about the misuse of animals in teaching programs in the past. First, students were sometimes exposed to animals before they had gained a thorough understanding of

pain, before their training in anesthesiology, and most certainly before any discussion of humane treatment. Second, little attention was given to proper surgical technique or the application of aseptic technique as part of the training in pharmacology, physiology, or the other preclinical sciences. Third, experiments were often too complex or lengthy for beginning students to accomplish. Fourth, when no one was concerned about whether the experimental animal lived or died, or was used for multiple procedures, a lack of humane consideration often ensued. Finally, there was little emphasis on instruction and training in postoperative care in the initial phases of the veterinary medical curriculum. In addition, some aspects of the misuse of animals can be attributed to overly sympathetic or overly calloused attitudes on the part of students.

Obviously, all these deficiencies cannot be blamed on any one college, but we have all participated to one degree or another in contributing to these sorts of misuse of animal resources. Every school must address the problem of how to correct its own problems. This means that curricula should be designed to include early exposure to the principles necessary for proper use of laboratory animals. Clinicians need to be involved at this early stage, in a manner that is consistent with the objectives of the chosen instructional model. Discussion of humane treatment and veterinarians' responsibility to animals, how the school purchases teaching animals, regulations for their control, and inventory and reporting procedures should be part of the first phase of the curriculum. Understanding of pain, and of its detection and recognition, should be included as early as possible in physiology classes. In addition, individual commitment by faculty members is an important element, as is the development of a faculty

committee on animal usage. A thorough grounding in postoperative care should also be one of the instructional objectives. Further, strict adherence to accepted surgical procedures and techniques of postoperative care must be demanded by instructors.

The ingredients of thoughtful and appropriate use of animals in an educational setting include: (1) a soundly designed curriculum, (2) numerous discussions on the thoughtful use of animals and the responsibilities that this goal entails in appropriate courses; (3) good examples set by faculty and staff; and (4) establishment of particular faculty responsibilities by a committee on animal usage and concern. It is important that the curriculum design include a sequencing of courses, such that physiology, pharmacology, and the basic principles of anesthesiology can be taught at the earliest possible time. A course on the principles of anesthesia and analgesics prior to their use in animal procedures in which pain may be involved is a must, as is the insistence that the techniques of aseptic surgery be taught before all laboratory exercises in physiology, pharmacology, etc., that involve surgical procedures (Fig. 2). The inclusion of live animals in the initial phase of the curriculum is a must, for example, a functional anatomy section on palpation of muscle groups, skeletal processes, etc.

Other principles that should be followed include the elimination of any use of animals, in experimentation and teaching, that results in pain for which no anesthetic is given. Also, emphasis should be placed on comparative medicine, by using a variety of appropriate species to introduce students to the diversity that can be expected in veterinary medicine, instead of depending entirely on dogs and cats (Fig. 3). The appropriate use of demonstrations by devices such as videotapes to reduce the



Figure 2. Phase I students in surgery lab, second quarter. The principles of surgery must be taught at the earliest practical point in the curriculum.

number of animals needed is an obvious consideration in curriculum design. Students should be taught to think of all teaching animals as potential patients, to ensure that the principles of exemplary care and a humane approach are part of all teaching activities of the curriculum. Students also need a full explanation of the legal and moral responsibilities that bear upon animal use early in the curriculum, as well as a consideration of some of the emotional issues involved.

Recently, there has been considerable discussion on the use of animals in teaching surgery. I believe that tissue repair requires an appreciation for the actual sensation of working with tissue and the relationship among organs, as well as practice in the art of stabilizing incisions. Much of this can only be learned by experience. In teaching these techniques, however, multiple-survival surgical procedures should not be used. It is my

opinion that the appropriate use of survival surgery instills an understanding of the elements of good pre- and postoperative care; without this training, callousness to animal life may develop. Also, survival surgery can help students learn other aspects of pre- and postoperative care, including how to process specimens for clinical pathology and other support procedures that will be required in veterinary practice (Fig. 4).

The program at the College of Veterinary Medicine, University of Tennessee is based on the premise that the education of future veterinarians, most of whom will devote their careers to animal-related problems, requires the development of concern and responsibility toward all animals. Let me close by noting that I have not used the phrase "animal rights" in this article. Personally, I believe that the thoughtful and humane use of animals in research, teaching, pro-



Figure 3. The use of a wide range of species during teaching is important.



Figure 4. Students giving preoperative care to their teaching dog. Students must be responsible for both pre- and postoperative care of animals.

duction, or other aspects of this society goes beyond the basic concept of rights. Rather, I feel that we have a moral responsibility toward animals, and that I have made a substantial commitment to this responsibility.

The principles of proper animal use in colleges of veterinary medicine cannot guarantee humane treatment in biomedical research. However, by setting a good example, our professionals can continue to contribute to improvement for the future, through education.

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