International Journal for the Study of Animal Problems

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LETTERS 170

EDITORIALS 171-175

NEWS AND ANALYSIS 176-187

Pet Foods, and Animal Health and Welfare • More Money in Support of Taub 176

Should Immunocastration Replace Surgical Castration? • Predicting Carcinogenic Potential with Mathematics 177

Vancouver Spay/Neuter Clinic Finds Unexpected Benefits 178

New Treatment for Cat Allergies • For Dogs, Chocolate Can Be Deadly 179

Rabies Diagnostic Technique for Live Animals • Socialization by Humans Reduces Health Risks Among Chickens • Jealousy an Innate Tendency in Dogs, Cats, as Well as People 180

Complex Tactics Required for Combat in Galapagos • The North American Black Duck (Anas rubripes): A Case of 28 Years of Failure in American Wildlife Management 182

ORIGINAL AND REVIEW ARTICLES 198-249

The Behavior of Confined Calves Raised for Veal: Are These Animals Distressed? — M. Kiley-Worthington 198

Selecting a Spay/Neuter Program for Animal Control in the City of Charlotte — D. Quisenberry and M.E. Clapp 214


Does Wildlife Have Legal Standing? — The Penguin Case in Patagonia — Pedro Tarak 229

Alternatives to Animal Experimentation — S.M. Niemi 241

LEGISLATION AND REGULATION 250-252

CURRENT EVENTS 253-260
Meeting Reports 253-256
Forthcoming Meetings 256-257
Announcements 258-260

BOOK NEWS 260-265

INSTRUCTIONS TO AUTHORS 266
Responsive Chord on Pets and Therapy

I just received my January-March 1983 issue of the International Journal for the Study of Animal Problems. Thank you for the wonderful editorial! What you are saying is so true! For the last 3 years or so I have worked in a nursing home as an “Animal Facilitated Therapist.” I started there on a volunteer basis, bringing my own animals into visit. The home decided to purchase animals of its own. None of the staff was knowledgeable concerning the animals or their care. Also, most felt that their job was with the residents, and not the animals. Little did they realize how much the residents suffered when the animals were removed. Consequently, the guinea pigs had maggots in their cage, the rabbits either starved or froze to death, birds passed away etc., etc. Once the home had animals of its own, I no longer made visits with mine. At that time we did not have a local humane society. I contacted the state society as well as a nearby society concerning the condition of the animals. They did nothing.

After the demise of so many animals, the nursing home hired me to care for them and to set up a “therapy” program. Once I started working at the nursing home, I was appointed by the lack of concern toward the animals that was shown by the staff. The prevailing attitude was that they were disposable—not living, feeling beings. Most of the residents, though, were very concerned about the animals, but were afraid to voice it. One resident confided her anxiety to me by stating that if she were to voice her concern for the animals, she might become labeled as a complainer. And complainers’ call lights were answered last.

I am not a scientific person, but I do know that animals help people. With the help of the animals, I “reached” many residents that did not respond otherwise. Very simply, friendship and trust arose from our mutual interest and concern for the animals. And what really surprised me is that this improved climate has continued over the months, even though I no longer work there. From what the residents tell me, the care of the animals, however, is still questionable. But we now have a humane society, and they are supposed to be keeping an eye on the welfare of the animals.

I don’t know what the answer is. I could see how much happiness and joy the animals brought to the residents—but at what price to the animals? I have gone back to school to obtain a degree in “Animal Facilitated Therapy.” This summer I would like to start an outreach program on my farm, working with my own animals. Then, I would at least know that the animals are receiving good care and are not being abused. Residents of such places as nursing homes suffer enough without having to shoulder the added burden of worrying about the care (or lack of it) of the animals that visit or live with them.

Jean Groner
Affinity Farm
Buffalo, MN 55313

I just read your editorial on “animal-facilitated therapy” in the new issue of the Journal, and I wanted to applaud your efforts! The pet therapy bandwagon has become so crowded and filled with sentimental supporters that it’s hard to get anyone to discuss the issue rationally. We’ve been facing the added frustration of dealing with local shelters that are shifting funds and personnel from their humane education programs to begin or expand “pet therapy” programs. Not to mention all the shelter puppies that are being dragged from nursing home to nursing home!

Good to hear another voice crying in the wilderness.

Kathy Savesky
NAAHE
Box 362
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The Question of Atheism and Communism in the Animal Welfare/Rights Movement

Michael W. Fox

We believe that it may be more than just sheer coincidence that, as the recent political winds have changed quite dramatically, environmentalists have been judged as “extremists,” and liberals labeled “un-American.” To be pro-conservation is now equated with being unpatriotic and opposing the free-enterprise system. To question the wholesale exploitation of animals by concerns like agribusiness or the biomedical industry is considered atheistic, since many believe that the word “dominion,” as used in Genesis, means that God has given us the unconditional right to exploit all creatures, for whatever purpose. And since we are “created in God,” we are not separated from God’s will. Furthermore, taking an environmentalist position is seen as questioning God’s word and His divine sanction, and as opening the door to those most potent forces of evil: communism and atheism.

Just as economics is increasingly being employed as a political weapon, so religion is now being used to further self-serving goals. Agribusiness spokesmen not only use fallacious economic arguments to justify the “factory” farming of animals; they have also stated that any questioning about man’s God-given right to exploit animals is atheistic, and perhaps an actual affront to God’s will. Furthermore, taking an egalitarian attitude toward animals, and proposing that they have rights should be given equal and fair consideration, is regarded as the inspiration of some covert communist conspiracy that is constantly working to restructure and thereby destroy U.S. agriculture.

In short, environmentalists, conservationists, and animal welfare activists are all being tarred with the same brush by those who consider any challenge to their economic and political values and self-serving religious beliefs as communism. Yet the fundamental issues addressed by these groups focus on moral responsibility, a concept that causes great discomfort to those who advocate industrialism, and both corporate and totalitarian socialism. The fact that the animal welfare/animal rights movement is evoking such parochial and paranoid opposition is perhaps, in actuality, a positive sign of its progress and growing influence. However, an apparent new wave of McCarthyism and religious bigotry does not bode well for our democracy as a whole, or for those organizations whose humane and egalitarian views are currently being discounted and misperceived as a communist threat to God and country.

Religion, Politics, and Personal Responsibility

With true maturity, there comes a time when the anxiety, insecurity, bigotry, violence, ignorance, and indifference in the world come to be understood, not as the works of the devil, of some anti-Christ, or of communist or imperialist ideology, but rather as simple facts of human existence. The reality of human nature can be accepted as something that is not intrinsically evil, but as a structure that is insecure and vulnerable, and so driven to control the world by force. We have
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Just as economics has increasingly been employed as a political weapon, so religion is now being used to further self-serving goals. Agribusiness spokespeople not only use fallacious economic arguments to justify the "factory" farming of animals; they have also stated that any questioning about man's God-given right to exploit animals is atheistic, and perhaps an actual affront to God's will. Furthermore, taking an egalitarian attitude toward animals, and proposing that they have rights or should be given equal and fair consideration, is regarded as the inspiration of some covert communist conspiracy that is constantly working to restructure and thereby destroy U.S. agriculture.

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good is consonant with the rights of other peoples, nations, and animals, as well as the environment as a whole. But when the good of any nation (or interest group) violates such rights, its claim to unquestioned righteousness under the “one nation under God” principle is invalidated. Those persons who purport to be religious are surely right only when they use religion to further the politics of an ecological, racial, and species egalitarianism that is based upon cooperation, a sharing of resources and respect for each other’s interests and rights; and a reverence for the sanctity and dignity of all life, animal and human alike; in brief, a co-creative stewardship of the planet Earth.

**Sex Roles, Companion Animals—and Something More**

D.H. Murphy

One of the fundamental convictions that motivates our publication of the Journal is that science, and the scientific method, can furnish animal welfare advocates and activists with the exact kind of testable, empirical data that must remain the primary tools of persuasion in a rational society. Precisely because animals cannot speak for themselves, and cannot tell us whether, for example, they prefer a solid concrete or a slatted floor, we can make good use of the carefully controlled techniques of classical science to derive “best guesses” about what kinds of environments foster their well-being. These may include direct methods such as structured observation and choice tests, or indirect methods such as monitoring of blood levels of stress-induced hormones like adrenocorticoids.

What’s fascinating about these kinds of well-controlled scientific studies is that more than our preconceptions about animals may fall by the wayside once we peruse the results; other standardized myths about, for example, sex roles, may come into question as well. As a case in point, several recent articles about how men and women relate to dogs and cats furnish us with some basic lessons about how we interact with our animal companions. But, in the process, they also shed some interesting light on the precariousness of our beliefs about differences in the sexes. Finally, they provide vital instruction concerning some of the classic foibles that are inherent in the use of some kinds of scientific methods.

First, let’s take a look at one way two researchers looked at how people think about dogs and cats. An earlier issue of the Journal (4(1):17, 1983) reported on the survey results compiled by two Missouri researchers, who queried over 900 individuals on their opinions of companion animals. Their analysis of the data showed that, among other things, “women become more emotionally involved with their animals and derive a greater sense of security from pet ownership (with both dogs and cats) than do men.” Now, this is the sort of result that you might have expected yourself, if you simply walked around the room at a party and queried the attendees about their emotions vis-à-vis dogs and cats. In either case, this method, self-reporting, is well recognized as unavoidably incorporating a sizeable dose of the interviewee’s own bias; in other words, people tend to an-
trouble coping with the fact that we are vulnerable; that life can hurt us and that we will eventually die; and that no amount of power and attempted control over life (a force that so often does violence to the rights of others less powerful, as well as to animals and the environment) can help us.

The Reverend Philip Zwerling (Washington Post, March 16, 1983) urges us not to blame communism or other foreign devils, but rather to assume responsibility for our own lives, and on that basis to build an egalitarian society. He states: "Who are the demons? Let us ask questions. Who built and used the first atomic weapon? Who built the first hydrogen bomb? The answer, we did. Let us not be distracted any more by theories of foreign evils. Let us say that our enemies are poverty and hunger, unemployment and inflation; and let us say, as did the Disciples Peter and John, that we wish to live in a society where "there was no needy person among them, and distribution was made to each as any had need."

The truth is that we can only help ourselves and the rest of creation by becoming more responsible, responsible citizens, children, teachers, consumers, pet owners, farmers, corporations, taxpayers, presidents, and other government employees, elected and otherwise.

The keys to this realm of moral responsibility, and of somehow getting beyond the barren sphere of corporate totalitarianism, materialism, relativism, and international paranoia, are to be found in such diverse, yet fundamental areas as religion, philosophy, ecology, and egalitarian economic and global democratic theory, all of which incorporate the concept of personal responsibility and self-determination. In essence, this ambivalence between personal self-interest and adult responsibility is the basic dialectical tension of life itself, and of human life in particular.

But some judgmental and moralizing organizations are now using religion to further their purely political ends. They would have the teaching of evolution, of ecology, and of egalitarian animal rights philosophy banished from our schools. And they would replace thought­ful enquiry into society’s religious and political values with a simplistic and moralizing conformity, which is promoted under the guise of religious instruction.

Nevertheless, there are some religious groups that are comprised of legitimately spiritual individuals. They do not use their tenets to further some gratuitous political ideology, nor do they invoke bogeymen such as the devil, or the communist or capitalist threat. They do not speak exclusively to God and country but, instead, of God, nature, and humanity. These people perceive God as love, not as some moralistic judge, or a patriarch remote and above us; and we, correspondingly, above nature and the animals. For they recognize that God created us as much in His image, as in theirs (Genesis 1:26); to consider otherwise is un-Christan form of the Greek hupar, or sheer vanity (Ecclesiastes 3:19). And to stand in moral judgment of others is un-Christian arrogance.

Yet when the ethical fabric of society is being frayed by the supposed forces of “evil” (ignorance, insensitivity, and indifference) and we begin to feel threatened by such political ideologies as totalitarian communism and corporate socialism or, on the other hand, by the potentially atheistic, amoral, and secular mindset of pure scientific empiricism and technologically based imperialism, then all religious and spiritually enlightened people of the world should feel morally compelled to act responsibly and with enlightened self-interest to oppose such forces. Not by casting stones, or by judging others, but by living courageous­ly, lovingly, and ethically serving the greater good of society only when such good is consonant with the rights of other peoples, nations, and animals, as well as the environment as a whole. But when the good of any nation (or interest group) violates such rights, its claim to unquestioned righteousness under the “one nation under God” principle is invalidated. Those persons who purport to be religious are surely right only when they use religion to further the politics of an ecological, racial, and species egalitarian that is based upon cooperation, a sharing of resources and respect for each other’s interests and rights; and a reverence for the sanctity and dignity of all life, animal and human alike; in brief, a co-creative stewardship of the planet Earth.

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The State of the Economy and Animal Welfare

Michael W. Fox

The economic depression affects more than just the human population. Unemployed people find it harder to feed their pets, and so animal shelters in depressed areas must take in more than their usual burden of dogs for adoption and destruction. Cases of animal neglect and cruelty increase as families disintegrate emotionally; the increased incidence of animal and child abuse is one tragic consequence of economic and psychological depression.

The hungry and disemployed in the cities have, at least, their soup lines, but not so for those in the depressed rural areas. Here, trapping of furbearers, such as muskrat and raccoon, is on the upswing, as is the hunting and poaching of deer. The negative impact on the environment of this trend is further intensified by the entropy-accelerating lifestyle and destruction. Trapping by hunters and destruction by farmers have starved because farmers have not been able to pay their feed bills; cattle in Texas have been allowed to starve to death, too, butidtheir demise is summarily written off as a tax loss.

The affluent continue to cling to the entropy-accelerating lifestyle and consumer habits that they so cherish, and have come to perceive as inalienable rights: for example, the right to wear furs and to eat meat, regardless of the extent of animal suffering involved and the waste of non-renewable environmental resources.

An economic depression inevitably means that the under-privileged are compelled to suffer, but the plight of animals during "hard times" is often overlooked. Further, the present administration's budget cuts, and the pro-industry policies expressed by the Environmental Protection Agency and the Department of the Interior, in conjunction with the attempted financial emasculation of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (responsible for enforcing the Animal Welfare Act), all add insult to injury. Clearly, in such difficult economic times, the needs of people will inevitably take precedence over those of animals. But a society that unconditionally places the rights and interests of humans over those of animals and the quality of the environment, on the grounds of a short-term (near-sighted) version of economic necessity, not only lacks enlightened self-interest, but is also providing the critical impetus for its own eventual nemesis. Hence, there is an even greater need today for humane education and the promulgation of animal welfare principles and the animal and environmental rights philosophies. However, we see that "economic recovery," improved farm and laboratory animal welfare, and environmental quality are considered as exclusive and even contradictory goals under the present administration. But can we continue to pay the ever-higher costs of sacrificing environmental quality and animals' welfare in order to promote the tunnel-vision goal of industrial "recovery?"

The United States' aggressive competition in the world agricultural market can mean a further decrement in farm animal welfare and environmental protection standards, just so we can gain a competitive edge over other countries. Similar economic incentives also mean that more animals are being trapped for their fur for export; more are used in biomedical research to find profitable "cures," and more deadly pesticides are being developed for sale abroad. The State Department is even considering lifting restrictions on the export of some human drugs and agrichemicals that have been judged too hazardous to have been used in this country.

In conclusion, the present economic situation is eroding the ethical principles of egalitarian democracy. But at the same time, its sad effect on animals is also stimulating greater concern for animal rights and welfare, and environmental protection. People are coming to realize that animal, human, and environmental well-being are inseparable and interconnected. An economy and industrial system that ignores these spiritual, ethical, and ecological interconnections will suffer the consequence: industrial self-destruction.
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And down on the "factory" farm, animals are being subjected to even greater stress and distress, as they are crowded together even more "intensively" to offset farmers' shrinking profits and rising debts. In some instances, poultry have starved because farmers have not been able to pay their feed bills; cattle in Texas have been allowed to starve to death, too, but their demise is summarily written off as a tax loss.

The affluent continue to cling to the entropy-accelerating lifestyle and consumer habits that they so cherish, and have come to perceive as inalienable rights: for example, the right to wear furs and to eat meat, regardless of the extent of animal suffering involved and the waste of non-renewable environmental resources.

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Pet Foods, and Animal Health and Welfare

The Pet Food Institute, which represents the pet food industry, has petitioned the Food and Drug Administration (in the Federal Register, vol. 48, no. 12, Tuesday, January 18, 1983) to seek FDA approval for proposed changes in the regulations that govern what information pet food manufacturers must include in their labels indicating the constituent ingredients of each product. Under the suggested new regulations, corn husks and peanut shells would be listed simply as “vegetable fiber”; hydrolyzed poultry feathers as processed “poultry protein products”; cheese rinds as “cheese”; and ground bones as “processed animal protein.”

Furthermore, the actual ingredients in each can of product would not be as ascertainable, since class (or category) names of some ingredients would be allowable—“cereal grains,” for example, could mean rice, barley, or wheat. Such vagueness in labeling could cause serious problems for those pets who are allergic to certain food materials such as wheat (which can cause epilepsy in dogs), since the pet owner would not know whether the harmful ingredient was present or not. And the labeling of animal by-products that are actually of little or no nutritional value as “protein” constitutes a practice that is not only misleading to the public, but can also be detrimental to animal health.

This recent move by the pet industry (which they claim will save themselves and consumers $200 million per year) seems to be motivated by three factors. First, the cost of quality ingredients continues to increase steadily. Second, the industry follows a policy of “lowest-cost feed formulation,” which leads to a downward spiral of deteriorating products, in which competitors strive to undercut each other by manufacturing palatable, but ever-lower-quality food with cheap ingredients. Third, these cheap and ready available ingredients are by-products of the highly diversified agribusiness/food industry; the industry therefore hopes to gain by profitably dumping its waste products into pet food subsidiaries, rather than using them as organic fertilizer.

Awareness of the downward spiral in the quality of pet foods has already induced many pet owners to buy the more expensive (but higher quality) brands that are recommended by their veterinarians, or to make their own pet food. And more veterinarians are finding that many pet health problems, especially those affecting the skin, are partially alleviated or totally cured, simply by taking the animal patient off all regular processed commercial pet foods. The precise magnitude of the effect of these foods on animal health problems remains only to be quantified.

The FDA has indicated that it is giving this petition serious consideration by making it public and therefore subject to public comment. To stop the proposed changes in labeling regulations, the Humane Society of the United States and the American Veterinary Holistic Medicine Association have already voiced their opposition, to protect pets and consumers from what could amount to a nationwide animal health dilemma.

More Money in Support of Taub

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The article admitted that earlier grants had generated controversy among some psychologists, who had argued that Taub’s case concerns veterinary care, not freedom of scientific inquiry. However, Taub, in his defense, has artfully turned the entire issue around to one of scientific freedom. The new $6,000 grant will purportedly be used immediately to pay for the transcribing and printing of each of the many animal proceedings, as is required by the Maryland State Court of Appeals because Taub is appealing his conviction.

Should Immunocastration Replace Surgical Castration?

These days, the literature on agricultural science abounds with reports on possible methods and preliminary results of tests with hormonal and immuno-castrating agents. In particular, the U.S. Department of Agriculture’s Research News has summarized the efforts of physiologist Bruce Schanbacher, of USDA’s Agriculture Research Service.

Dr. Schanbacher has developed a method that employs the hormone LHbH (or “luteinizing hormone releasing hormone”), which causes the release of luteinizing hormone (LH) from the pituitary. The presence of this hormone in the blood works to suppress the production and secretion of some hormones that are responsible for male characteristics: gonadotropin from the pituitary and, in turn, testosterone from the testis. After LHbH treatment, rams showed severe inhibition of testicular growth and total loss of testis function, accompanied by weight gains comparable to those of surgical castrates. An alternate procedure, immunization of lambs against testosterone, was only partially successful, since the testes remained normally sized, and continued to produce sperm and to excrete testosterone.

In the Research News article, the USDA expressed its hope that: “Immunocastration could be an effective alternative to surgical castration—and without the stress and discomfort associated with conventional castration.” This is the lead sentence of the article; it raises some hesitant expectation that one important rationale behind the research reported in the following paragraphs might be concern for animal welfare. Yet, as you read on, the weight of evidence seems to suggest that the chief reasons for perfecting immunocastration techniques are what else! efficiency and profitability. As Schanbacher observes, the shock of surgical castration, and the potential for hemorrhage and later infection, “can contribute to temporary or prolonged setback in animal growth and performance.” Also, immunocastration, since it can easily be done to an animal at any age, can be targeted for a “specific stage in the growing-finishing process” to promote lean growth and optimize lean-to-fat ratios.

What this choice of verbiage seems to indicate, then, is that animal welfare may not be a prime consideration in the fine-tuning of immunocastration techniques or their potential large-scale application. While, on balance, these new methods of castration would appear to be less traumatic and injurious to animals, animal welfare advocates will have to keep a close eye on continuing developments, to ascertain that welfare considerations are not simply left in the dust, in the ever-quickening race for more efficient ways to convert plant stuffs to animal protein.

Predicting Carcinogenic Potential With Mathematics

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Pet Foods, and Animal Health and Welfare

The Pet Food Institute, which represents the pet food industry, has petitioned the Food and Drug Administration (in the Federal Register, January 18, 1983) to seek FDA approval for proposed changes in the regulations that govern what information pet food manufacturers must include in their labels indicating the constituent ingredients of each product. Under the suggested new regulations, corn husks and peanut shells would be listed simply as "vegetable fiber"; hydrolyzed poultry feathers as processed "poultry protein products"; cheese rinds as "Cheese"; and ground bones as "processed animal protein."

Furthermore, the actual ingredients in each can of product would not be ascertainable, since class (or category) names of some ingredients would be allowable cereal grains," for example, could mean rice, barley, or wheat. Such vagueness in labeling could cause serious problems for those pets who are allergic to certain food materials such as wheat (which can cause epilepsy in dogs), since the pet owner would not know whether the harmful ingredient was present or not. And the labeling of animal by-products that are actually of little or no nutritional value as "protein" constitutes a practice that is not only misleading to the public, but can also be detrimental to animal health.

This recent move by the pet industry (which they claim will save themselves and consumers $200 million per year) seems to be motivated by three factors. First, the cost of quality ingredients continues to increase steadily. Second, the industry follows a policy of "lowest-cost feed formulation," which leads to a downward spiral of deteriorating products, in which competitors strive to undercut each other by manufacturing palatable, but lower-quality food with cheap ingredients. Third, these cheap and readily available ingredients are by-products of the highly diversified agribusiness/food industry; the industry therefore hopes to gain by profitably dumping its waste products into pet food subsidiaries, rather than using them as organic fertilizer.

Awareness of the downward spiral in the quality of pet food has already induced many pet owners to buy the more expensive (but higher quality) brands that are recommended by their veterinarians, or to make their own pet food. And more veterinarians are finding that many pet health problems, especially those affecting the skin, are partially alleviated or totally cured, simply by taking the animal patient off all regular processed commercial pet foods. The precise magnitude of the effect of these foods on animal health problems remains only to be quantified.

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Predicting Carcinogenic Potential With Mathematics

Whether the litany of potential techniques for replacing the use of live
animals as subjects in toxicity testing comes up, “computer modeling” will be certain to be dutifully placed on the list. Yet, while numerous illustrative examples will be provided for the other types of alternatives listed, examples of computer modeling often seem to be conspicuously absent. This is due in no small part to the fact that such models require considerable mathematical sophistication. However, K. Enslein and P.N. Craig have recently published an article (J. Toxicol. Environ Health 10:521-530, 1982) that summarizes a model for predicting the carcinogenic potential of chemicals according to their possible carcinogenicity.

The equation was found to have correctly classified between 87 and 91 percent of the definite carcinogens, and between 78 and 80 percent of the indefinite carcinogens (according to comparisons with IARC data). In several cases, the authors even assert that the results of their work indicate that the testing in animals is suspect, and that their equation is a better predictor than live-animal or other tests on animal-derived material.

To derive the equation of the model, Enslein and Craig utilized data on known carcinogens compiled by the International Agency for Research on Cancer. Information on 343 compounds was obtained from IARC records. Each of the compounds was then characterized according to the chemical characteristics of its substructural elements (such as the presence of various non-cyclic components), as well as certain physical parameters—though only molecular weight proved to be of real utility in assessing carcinogenicity). Then, from the list of potential chemical characteristics that possibly have been related to carcinogenicity, those parameters that contributed least to the ability to discriminate between definite carcinogens and indefinite carcinogens were weeded out by mathematical techniques. Several further mathematical manipulations were conducted next to further narrow and refine the list of characteristics that are predictive of carcinogenic potential. Finally, statistics were employed to the results of the final equation to verify its accuracy. Any final assessment of a compound’s potential for inducing cancer, however, must come from an integration of the results derived from the analysis of the various sub-components and other parameters that make up the chemical, since the breakdown into substructure that is part of the model means that only the fragments are correlated with carcinogenicity.

This means that the equation developed from the model attempts only to classify chemicals according to their possible carcinogenicity, possibly have been related to carcinogenicity. But in that article include induced vomiting and diarrhea. Dental lavage with an activated charcoal bar, to a long serum half-life, or both. The authors speculated that this delayed rate of clearance from the blood might be caused by slow absorption of theobromine from the bowel, a long serum half-life, or both. In contrast, the serum half-life for theobromine in humans is only 7 hours. Potential treatment suggested in the article include induced vomiting and gastric lavage with an activated-charcoal “shake.” But, as usual, the best treatment is prevention — an awareness among owners of the danger that chocolate poses for dogs, coupled with a sensitivity to suspicion of theobromine poisoning as a possible cause of otherwise inexplicable symptoms, such as a sudden onset of agitation and incontinence.
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First, it is important to keep in mind that the Craig-Enslin model is described as “a predictive structure-activity model.” This means that the equation developed from the model attempts only to classify chemicals according to their possible carcinogenic potential; there is no attempt in this work to formulate a hypothesis of, or test for, cause-and-effect relationships.

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The equation was found to have correctly classified between 87 and 91 percent of the definite carcinogens, and between 76 and 80 percent of the indefinite carcinogens (according to comparisons with IARC data). In several cases, the authors even assert that the results of their work indicate that the testing in animals is suspect, and that their equation is a better predictor than live-animal or other tests on animal-derived material.

The model will have to be updated as necessary to accommodate new data, and as better means of characterizing the sub-components of potentially carcinogenic compounds become available. But this kind of effort, when intelligently integrated with results from other nonanimal studies like the Ames test, may well serve to greatly reduce the numbers of the relatively crude tests in whole animals that are being performed today.

New Treatment for Cat Allergies

Those of us who thought that allergies to cats were caused primarily by dander from the animals were surprised to read a USA Today note (March 29, 1983) of a new therapy for the problem, which involves desensitizing injections that use purified extracts of cat saliva. Speaking before a meeting of the American Association of Allergy and Immunology, Dr. John Ohman described his results with a 3-month series of saliva-derivative injections, which subjects achieved permanent, although partial, relief of symptoms. It had previously been hypothesized that cat-allergy symptoms are triggered when cat saliva becomes vaporized as the cats lick themselves in grooming.

Dr. Ohman is hoping to receive FDA approval to market the saliva-derived material in 2 years.

Vancouver Spay/Neuter Clinic Finds Unexpected Benefits

In 1976, the city of Vancouver, B.C., opened a low-cost spay and neuter clinic. Since that time, the city’s SPCA has been happily compiling an ever-increasing list of significant benefits that seem, directly or indirectly, to have resulted from the spay/neuter program. Some examples, as reported in the Spring 1983 edition of Animals Canada:

- The city pound is beginning to lose money, because so few stray dogs are now found wandering around the city.
- Pet owners are showing more responsible behavior—in 1976, the SPCA reported that 80,000 animals had to be euthanized; in 1982, only 15,300 were killed.
- The claim rate for animals that are impounded has increased from 33 to 70 percent.
- Complaints of cruelty have declined by 50 percent, because the surplus of animals has been reduced so significantly.
- Reported numbers of dog attacks have been halved, because neutered males tend to remain at home.

For Dogs, Chocolate Can Be Deadly

There appear to be few species capable of resisting the appeal of chocolate. It is even possible that disdain in the presence of chocolate could provide the most plausible basis for distinguishing genuinely sentient from nonsentient organisms. But in dogs, one of the chemicals in chocolate, the stimulant theobromine—which is closely related to caffeine and theophylline—can result in urinary incontinence, seizures and, finally, death.

A. Glauberg and H.P. Blumenthal, reporting in the Journal of the American Hospital Association (19:246-248, 1983), described a case of fatal intoxication with theobromine in a 21-kg female springer spaniel. During a single afternoon, the dog had eaten a 2-pound bag of Hershey’s chocolate chips. That evening, some mild symptoms began to appear: the dog was restless and had urine incontinence. The next day, the animal’s condition had deteriorated noticeably, and she had become “agitated and extremely nervous.” The generalized convulsive seizures continued for 20 minutes; after 15 to 20 minutes of seizures, the animal died.

Postmortem testing showed that, at the time of death, the dog had a serum theobromine concentration of 133 mg/liter. She had most likely ingested about 1,920 mg of theobromine, which is approximately 5 times the amount given therapeutically (theobromine was formerly used to treat angina pectoris, cardiac insufficiency, and some forms of arteriosclerosis). To find out what had happened in this unfortunate case, the authors noted that the marked decrease in blood levels had resulted in the onset of seizures and death in the springer spaniel, and that their equation implied that the theobromine levels before chocolate ingestion, and at 10 observation points over the first 28 hours after ingestion. They found that blood theobromine level peaks at about 4 hours after chocolate is fed, but then decreases only very slowly over the next 24 hours. The authors speculated that this delayed rate of clearance from the blood might be caused by slow absorption of theobromine from the bowel, a long serum half-life, or both. In contrast, the serum half-life for theobromine in humans is only 7 hours.

Potential treatments suggested in the article include induced vomiting and gastric lavage with an activated-charcoal "shake." But, as usual, the best treatment is prevention—an awareness among owners of the danger that chocolate poses for dogs, coupled with a sensitivity to suspicion of theobromine poisoning as a possible cause of otherwise inexplicable symptoms, such as a sudden onset of agitation and incontinence.
Rabies Diagnostic Technique for Live Animals

Of all the terrible consequences of rabies, one of the worst is that an animal that is merely suspected of having the disease must be killed in order to get a reliable diagnosis. This is because the standard method currently in use for identifying rabies requires that a sample of brain tissue be submitted for testing. If the diagnosis is positive, the animal would have had to be killed anyway. But if the result comes back negative, it is too late to save the animal; it can only become another statistic in some table in a public health report.

However, a new method, described by B.C. Wright (Vet Med Small Anim Clin 78:237-238, 1983) makes use of tactile hair samples from living animals to arrive at a rapid diagnosis of rabies. It was previously known that the rabies antigen can be found in the nerves of the skin, especially those that are of cranial origin. So Wright reasoned that the tactile hairs, which are richly supplied with such nerves, might be a good source of diagnostic material.

He took hair samples from a calf suspected of having rabies and, after sectioning them in a cryostat, stained them with fluorescein thiochyanate-labeled globulin. Under ultraviolet microscopy, the fluorescent antigen-antibody complexes were clearly visible, thus confirming the presence of rabies. Subsequent examination by the standard histological method, done on a section of the calf's brain after it had died, further corroborated the identification of rabies.

This method is quick (results can be obtained in 6 to 8 hours), and does not require shipping of samples to a distant regional lab. It is to be fervently hoped that this new method will be adapted for testing in other species, and made generally available, when perfected, for large-scale testing in both wild and domestic animals.

Socialization by Humans Reduces Health Risks Among Chickens

Beginning on the first or second day after hatching, chickens studied for the effects of socialization were divided into three treatment groups. The first group were "socialized" by the use of slow, deliberate movements among husbandman; they were also talked to softly and offered food (corn) by hand. The second group were simply "ignored"; they were given minimal human contact. The third group, the "hassled" birds, were ignored for the first 4 weeks of life. Then they were shouted at, their cages were banged on, and loud noises were made in the room. (They were never physically harmed, however.) All three groups were then challenged with inoculations of Escherichia coli and were tested for antibody response to cardiolipin and red blood cell antigens.

Simple observation showed that the socialized birds showed better behavioral adjustment to their environment than did the other two groups: they "eagerly approached the research worker's hand" and ate the offered corn. When they were touched, they faced the worker and made no attempt to flee. Ignored and hassled birds were both more fearful of any handling and avoided contact with humans whenever possible.

In terms of the two immunological measures, the socialized birds showed far better development of immunity to E. coli. They also demonstrated far less variance among individual birds, in terms of strength of immune response, than did those in the other two groups. Socialized birds also had an increased antibody response to the RBC antigen administered. (Abstracted from W.B. Cross and P.B. Siegel, Am J Vet Res 43:2010-2012, 1982.)

Jealousy an Innate Tendency in Dogs, Cats, as Well as People

In attempting to study whether the phenomenon of jealousy is a culturally conditioned, i.e., learned behavior, E.W. Mathes and D.J. Deuger (Psychol Rep 51:351-354, 1982) were really interested in getting some sound data for refuting the "culturally conditioned" side of the innate vs. learned behavior controversy. But to test their hypothesis that jealousy was, in an inborn "distress response" and an inevitable concomitant of love that is only subsequently modified by learning, the investigators studied jealousy in dogs and cats, as reported by students who owned these animals.

In particular, the authors hoped to provide evidence to counter recent suggestions that, since jealousy is merely a learned behavior, it can be rapidly unlearned. In their 1972 book, Open Marriage, N. and G. O'Neill claimed that jealousy is neither natural, instinctive, nor inevitable, and cited anthropological evidence of cultures, such as the Eskimo, where jealousy is nearly absent. The O'Neills then asserted that the prime cause of jealousy in Western society has a quite specific and destructive root: sexual exclusivity.

Mathes and Deuger therefore studied student reports of inferred jealousy in their companion animals, to see if in fact jealousy had a more generic causation—the perception of any threat to a love relationship, regardless of whether sexual exclusivity was a factor or not. The behavior of the students' 58 cats and dogs was studied via a questionnaire, which consisted of some yes-or-no questions (sample: Has your pet ever shown signs of jealousy?) and three open-ended questions (sample: If your pet has shown signs of jealousy, what kinds of emotions does it show when it is jealous?). To make sure that the students' responses were not just projections of their own jealousy, the authors published "Cures" for jealousy that were commonly used included giving attention to the animal, just letting the animal get over the bout of jealousy by itself, getting to like the third party, and talking to it.

Noting the considerable similarity in the general phenomenon of jealousy among both dogs and cats, the authors stated that the high incidence of jealousy imputed by students to both species "suggests that jealousy is probably an innate response," and observed that "replication of the correlation between love and jealousy described in the behaviors of cats and dogs suggests that the dynamics of jealousy transcend species.

What is most interesting in this article to those interested in animal welfare, however, is the extent to which these authors, publishing in a psychological (not an animal-oriented) publication, feel comfortable ascribing human emotions to dogs and cats. Cats and dogs are reported as showing a broad range of affect: sadness, affection, anger, anxiety, and loneliness. This development seems to bode well for those of us who feared that the realm of emotion was, in the minds of those working in the discipline of psychology, to be forever limited to the sole purview of Homo sapiens. The endless cries of "anthropomorphism" in respect to animal emotion seem, at least in some quarters, to be subsiding.
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Complex Tactics Required for Combat in Galapagos

Bruce Rudd and Robert Barnett, in a recent issue of the Journal (4(1):44-58, 1983), related the story of efforts to control the burgeoning population of wild dogs on the islands of the Galapagos. In earlier years, the dogs had had only a minimal impact on native species, preferring to prey on other introduced species. But then, in recent times, native species, especially land and marine iguanas, began to become common prey for the dogs. Some means for controlling the dog population had to be devised. Poisoned baits were selected, because these could be carefully placed in sites where dogs, who locate food primarily by using scent, would easily find the baits, whereas indigenous Galapagos animals, who use vision to get food, would not be able to find them.

But an article in New Scientist (97:161, 1983) told of a whole panoply of problems that are being concurrently caused by the multitude of introduced species in the islands: goats, pigs, donkeys, cattle, cats, mice, rats, fire ants—and dogs. Each of these species presents its own particular kinds of stresses for the environment. Wild goats, for instance, are very fertile and can even drink sea water. They strip all of the vegetation and much of the bark off every tree and shrub in sight. This wholesale destruction of plant life compromises the lives of competing giant tortoises and land iguanas and, by altering insect habitats, also affects its birds and bat populations.

Yet this is hardly a simple case of bad (recently arrived) guys vs. good (older resident) guys. For one thing, there are complex interrelationships among the exotic species themselves. The dogs, for instance, attack feral cattle and help keep cat populations in check. Any strategy aimed at totally wiping out feral dogs would have to take these kinds of facts into account.

Other facts complicate any attempt at an overall battle plan for reducing exotic species. Goats, for example, were formerly selected as the prime target for eradication, until hunters realized that, in the absence of goats, vegetation quickly grew back, making it extremely difficult to spot the wild pigs slated for destruction.

In fact, the problem of mass eradication of introduced species is so overwhelming that Dr. Friedemann Köster, director of the Charles Darwin Research Station, is considering calling in the Ecuadorian army, with a force of at least several hundred soldiers, to begin an attack on the whole gamut of these species. The dangers implicit in this tactic quickly come to mind, since it is hard to imagine soldiers with sufficient discriminating powers to ensure that only exotics would be killed.

Pondering the potential for disaster in Köster’s plan for a second D-Day invasion, Dr. Andrew Laurie, who is currently studying iguanas on the island, wonders whether a better tactic might be to place “more emphasis on local control, and the protection of certain breeding colonies of the species we want to preserve.”


The population of the North American black duck (Anas rubripes) has declined drastically and steadily since 1955 (Fig. 1). In spite of this decline, which has now reached about 60 percent of the population, the U.S. Fish and Wildlife Service has failed to take consistent and sustained regulatory action to allow restoration of the population (Table 1).

Indeed, in 1968, at the Black Duck Symposium, which convened most if not all of the then-acknowledged experts on black ducks, the participants concluded that (1) the black duck population was at its lowest level in about 20 years and (2) the FWS should undertake a program of major regulatory restrictions aimed at restoring the population (Barske, 1968; Addy, 1968a). Notwithstanding that recommendation, since 1968, regulations have, in sum, only been liberalized and, indeed, each year since 1970 regulations

![Table 1: Atlantic Flyway Hunting Regulations — 1953-1982*](image)

1. Possession limit is double the daily bag in all instances. Split season allowed with 10% penalty through 1969 and no penalty thereafter. Table 1 was provided by the U.S. Fish and Wildlife Service, 1982.
2. **50 Days, with Wednesday noon opening.
3. ±5 Days, with Wednesday noon opening.

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**FIGURE 1** Black duck Winter Inventory, 1955-1982. (From H. Spencer, Black Duck Management Plan, adopted by the Atlantic Waterfowl Council, 1982.)
Complex Tactics Required for Combat in Galapagos

Bruce Rudd and Robert Barnett, in a recent issue of the Journal (4(1):44-58, 1983), related the story of efforts to control the burgeoning population of wild dogs on the islands of the Galapagos. In earlier years, the dogs had had only a minimal impact on native species, preferring to prey on other introduced species. But then, in recent times, native species, especially land and marine iguanas, began to become common prey for the dogs. Some means for controlling the dog population had to be devised. Poisoned baits were selected, because these could be carefully placed in sites where dogs, who locate food primarily by using scent, would easily find the baits, whereas indigenous Galapagos animals, who use vision to get food, would not be able to find them.

But an article in New Scientist (97:161, 1983) told of a whole panoply of problems that are being concurrently caused by the multitude of introduced species in the islands: goats, pigs, donkeys, cattle, cats, mice, rats, fire ants — and dogs. Each of these species presents its own particular kinds of stresses for the environment. Wild goats, for instance, are very fertile and can even drink seawater. They strip all of the vegetation and much of the bark off every tree and shrub in sight. This wholesale destruction of plant life compromises the lives of competing giant tortoises and land iguanas and, by altering insect habitats, also affects its birds and bat populations.

Yet this is hardly a simple case of bad (recently arrived) guys vs. good (older resident) guys. For one thing, there are complex interrelationships among the exotic species themselves. The dogs, for instance, attack feral cattle and help keep cat populations in check. Any strategy aimed at totally wiping out feral dogs would have to take these kinds of facts into account.

Other facts complicate any attempt at an overall battle plan for reducing exotic species. Goats, for example, were formerly selected as the prime target for eradication, until hunters realized that, in the absence of goats, vegetation quickly grew back, making it extremely difficult to spot the wild pigs slated for destruction.

In fact, the problem of mass eradication of introduced species is so overwhelming that Dr. Friedemann Köster, director of the Charles Darwin Research Station, is considering calling in the Ecuadorian army, with a force of at least several hundred soldiers, to begin an attack on the whole gamut of these species. The dangers implicit in this tactic quickly come to mind, since it's hard to imagine soldiers with sufficient discriminating powers to ensure that only exotics would be killed.

Pondering the potential for disaster in Köster’s plan for a second D-Day invasion, Dr. Andrew Laurie, who is currently studying iguanas on the island, wonders whether a better tactic might be to place “more emphasis on local control, and the protection of certain breeding colonies of the species we want to preserve.”


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**TABLE 1 Atlantic Flyway Hunting Regulations – 1953-1982**

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** 50 Days, with Wednesday noon opening.
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INT J STUD ANIM PROB 4(3) 1983
have been more liberal than they were in 1968 (Table 1). Furthermore, the numbers of hunters have increased by 45 percent in the Atlantic and Mississippi Flyways from 1968 to 1982, thus compounding the effect of the liberalized season.

In 1980, the FWS (Anon., 1980a) published the Migratory Bird Management Document, in which it established a goal of attaining an index level of 450,000 wintering black ducks by 1982. However, during the years 1979 to 1982, the FWS took not one regulatory action aimed at achieving that goal (Table 1), and the goal was never approached, much less achieved (Fig. 1).

**Hunting as a Cause of Death**

Since and including 1968, numerous studies have been conducted on the cause of decline. None of these studies has proven conclusively and irrefutably that hunting is the cause or only cause of decline. However, beginning in 1968, all of those studying the black duck have noted that hunting is the major cause of killing duck mortality, and most have concluded that overhunting is the likely cause of the black duck decline (Martinson et al., 1968; Geis et al., 1971; Crissey, 1976; Anon., 1980; Blandin, 1982).

Four of these studies deserve particular note. In 1976, Crissey, who had served as Chief, Migratory Bird Population Station, for 10 years, evaluated, both directly and indirectly, hunting and other causes of black duck mortality. He concluded that hunting was the likely cause of the population decline. In 1980, the FWS labeled the continuing decline of the black duck population the twentieth most important resource problem facing the United States. The FWS convened a meeting of some 19 waterfowl, coastal, and estuarine experts to examine the problems facing the black duck. These experts, after evaluating all potential hunting and non-hunting mortality factors, concluded:

"That the declining numbers of black ducks are primarily the result of annual mortality that exceeds production. Most of that mortality is directly related to hunting. (Anon., 1980)"

Finally, in 1982, both the black duck committee of the Atlantic Waterfowl Council (Spencer, 1982a) and the doctoral dissertation of the Atlantic Flyway Council Biologist Dr. Warren W. Blandin concluded that hunting of black ducks was causing the population decline.

While every one of these "conclusions" are theoretically debatable in that one may never know with absolute certainty which, among many, mortality factors would have killed the ducks that would otherwise have nested, it is only reasonable to assume that hunting is the cause of the decline when, as in the instance of black ducks, hunting is the known cause of more than 50 percent of the total annual mortality (Blandin, 1982; Geis et al., 1971), and other mortality causes have been examined and found to be within reasonable, normal limits. Furthermore, as those at the Black Duck Symposium (Addy, 1968) and others (Spencer, 1982) have noted, hunting mortality is the only mortality factor that wildlife managers can control, at least in the short run.

And, all ethical arguments for and against sport hunting and other mortality causes have long prosed that their one overriding responsibility was to protect and preserve viable populations of wildlife, presumably throughout their ranges.

**Other Possible Causes of Decline**

But for the North American black duck, this has clearly not been done. Once, the black duck was a major breeding bird in most of the eastern one-third of the United States. Now, its only significant breeding populations in the United States are in the extreme north-east (Massachusetts, Maine, etc.), and even there suitable breeding habitat remains vacant (Hagler, 1962; Longcore, 1981), and overall black duck productivity (in terms of young per breeding female) remains high (Blandin, 1982; Crissey, 1976). Taken together, these facts are indicative of breeding habitat that is notably understocked relative to "carrying capacity" and where debilitative factors that reduce productivity are not a serious factor. Similarly, there is no evidence that winter mortality or habitat loss is a cause of the continuing population decline. Winter habitat has been destroyed, but fortunately not in sufficient quantities to have caused the severe and continuing population decline (see Barkske, 1971; Geis et al., 1971; McGilvey, 1974; Crissey, 1976; Anon., 1980; Blandin, 1982; Grandy, 1982). Similarly, while hybridization with the similar mallard (Anas platyrhynchos) no doubt creates a drain on the extant black duck population, it cannot be implicated as the cause of the decline. Rather, the existence of understocked breeding habitat, the high productivity, and the analyses of Blandin (1982). Crissey (1976), Anon. (1980), and Grandy (1982) suggest that this factor, while possibly of increasing importance, is not implicated as the cause of the decline.

**The Role of FWS**

The question remains, Why has the FWS allowed this situation to develop without taking corrective action? Why has FWS ignored the guiding tenet of wildlife management, that the first duty is to preserve and protect the population base? Why has FWS consistently ignored the principle that mortality due to sport hunting is the one form of mortality that wildlife managers can control? Why has FWS consistently ignored the best recommendations and suggestions of its own experts that hunting be severely limited to allow the population to rebuild to the extent possible? Why has the FWS consistently failed to give the benefit of the doubt to the survival and welfare of the species? After all, the annual kill of black ducks is about 750,000; hunting causes between 50 and 60 percent of the total annual mortality; and the population continues its gradual decline and will undoubtedly never be able to recover its population (even if hunting mortality ends immediately) in portions of its former range from which it has been exterminated. With all this evidence, the question remains, Why has this been allowed to happen? And the answer, while it is perhaps best exemplified by the case of the black duck, is also important for many other species of American wildlife, because this case, sadly, is hardly unique.

The first analysis of the failure of the FWS regulatory system, with respect to the black duck, was conducted by Ted Williams (former Editor of the Massachusetts Fish Wildlife Agency magazine, Massachusetts Wildlife) in the prestigious hunting journal Gray's Journal. Williams concluded:

"And indeed, it appears that the management complex has permitted the black to be sorely overshot. Since the peak in the mid-1950's, hunting and non-hunting mortality factors have annually accounted for between 15 and 25 percent of the population, certainly a significant chunk when you consider the other pressures on the species. Furthermore, in the current population of black ducks there is an abnormally high mortality of juveniles—a solid indication in any species of heavy mortality among adults. Although the daily bag limit was cut from four to two quite a while after it became evident that the black duck was in serious trouble, the number of big black duck hunters has since doubled. Thus, despite the attempted curtail, the rate of harvest has essentially remained constant. As one courageous federal waterfowl biologist publicly declared... increased hunting pressure has nullified much of the management effort. Administrators must decide on a population objective for the black duck. If they sanction a program of population increase, they must recognize that the measures necessary to achieve that objective will hurt!"

Sadly, however, the management bosses who dictate fish and wildlife policy lack self-discipline. The problem is that they are funded almost entirely by sportsmen—the very party they are obligated to regulate and educate. Imagine the curriculum at a school where the children are denied representation in conservation decision making. The current set-up is as unfair to sportsmen—whose long-term best interests are not being served—as it is to non-sporting conservationsists who are denied representation in conservation decision making.
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Managers have traditionally employed winter counts as a tool for setting waterfowl seasons. Yet, last year when a group of conservation organizations, calling themselves The Friends of the Black Duck, argued for a brief moratorium on black duck hunting, citing 21 years of dwindling winter counts as evidence of the need, they were informed by the management complex that the counts were unreliable. Managers can't have it both ways. Winter counts can't be effective tools for modern game management when they want to sell licenses, and worthless guesstimates when someone wants to limit immediate hunting opportunity.

When the conservation group communicated their concern over the black duck's plight to some of the fish and game departments in the Atlantic Flyway they received the most curious responses—to the effect that the black was such a popular game species that hunters couldn't be asked to refrain from shooting out the resource. Typical of this doublethink was the astonishing declaration of the Migratory Bird Research Leader of Maine. "I'm sure you're aware," said he, "that the black duck is the only significant puddle duck in most of the Northeast and to deprive Maine hunters of any chance to harvest the black duck is of critical value— to the State Fish and Game (or Wildlife) Agencies of the individual states in New England. License fees largely support the operations of State Fish and Game Agencies. It is widely believed in much of New England that if hunters could not hunt black ducks, many would not hunt, thus substantially reducing the revenues that pay for salaries and programs of Fish and Game Departments.

The trouble with fish and game departments these days is that they don't manage fish and game, they manage sportsmen; and they aren't staffed by biologists, they're staffed by sociologists. The concern is not for the problems of the black duck, or even the problems of the black duck hunter of 1980. It is for the appetites of the vociferous, atypical black duck hunter of the moment—the one breathing down the manager's neck. Such is the effect of special-interest funding on professional principles. (Williams, 1976, pp. 34-35).

Pressures on FWS to Preserve the Status Quo

While Williams' conclusion is compelling and, in my view, largely accurate, it omits, probably because of the author's familiarity with the regulatory processes, the substantial and critical portions of the analysis. First, the black duck is valuable: even with reduced numbers, it is still the prize duck for hunters in the New England states. Put another way, many hunters prize the black duck above all other species, because it is wary and reputedly difficult to kill (Hagar, 1982). Thus, the black duck is valuable, beyond any monetary value, to the individual hunter who esteems the black duck as a trophy or prize. For avid hunters who do not know or do not care about the decline of the black duck, there is a powerful lobby for continued or increased hunting of black ducks; even hunters who do know and do care will be intimidated from taking on their fellow hunters and changing the status quo.

Furthermore, the black duck is of critical value—or is thought to be of critical value—to the State Fish and Game (or Wildlife) Agencies of the individual states in New England. License fees largely support the operations of State Fish and Game Agencies. It is widely believed in much of New England that if hunters could not hunt black ducks, many would not hunt, thus substantially reducing the revenues that pay for salaries and programs of Fish and Game Departments.

So both of these forms of value furnish an impetus for continued black duck hunting.

Finally, the New England states are politically powerful both in the United States government and in the Atlantic Waterfowl Council, an influential organization of Fish and Game Agency officials which recommends (to FWS) waterfowl hunting seasons for each state in the Atlantic Flyway. Inevitably, there is the feeling that "I'll help you with your seasons (and license fees), if you help me with mine." And, there is the not-so-subtle fear that "professionals" will lose credibility if the FWS now, after all the years of defending the status quo, admits that the season should be closed.

But the key to the failure of the regulatory system is the value, real or perceived, to the hunter or the bureaucracy which is dependent upon hunting license fees and a hunter constituency. In case after case, to varying degrees, this pattern of yielding to vocal consumptive interests, to the detriment of wildlife, has become apparent wherever the wildlife species at issue is perceived as valuable for recreational, trophy, or commercial purposes, or is perceived as having great significance for generating hunter interest and license fees, and wherever active demand exceeds the capacity of the species for regeneration. This pattern has been apparent most recently with respect to continued excessive killing of bobcats (Lynx rufus) in many areas, and is becoming increasingly apparent with respect to regulations concerning other highly sought species of waterfowl such as mallards, canvasbacks (Aythya valisineria), and pintails (Anas acuta acuta), all of which are currently at or near historic low population levels, and all of which have been the subject of essentially the same regulations for many years. Moreover, the problems will increase if waterfowl and other wildlife populations decline, while hunter pressure on and demand for the species remains high.

Clearly, if wildlife and the discipline of wildlife management are to survive, wildlife managers must avoid the obvious failure of management which has been so persistently visible in the case of the black duck and assure, first and foremost, that the welfare of wildlife is insured.

(This is a synopsis of a special supplement by Dr. John W. Grandy which, along with complete reference documentation, will be published in the journal in its next edition. Dr. Grandy has spent much of his life studying the black duck, and wrote his Ph.D. thesis on the subject in 1972.)
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Comments

Psychology and Its Animal Subjects

Kenneth J. Shapiro

Kenneth J. Shapiro is President of Psychologists for the Ethical Treatment of Animals, c/o Psychology Department, Bates College, Lewiston, ME 04240.

By way of introducing Psychologists for the Ethical Treatment of Animals (PsyETA) to readers of the Journal, I have been asked to make some comments about the organization and, from a personal point of view, to suggest some of my own positions and views.

Rationale and Inception

Dr. Emmanuel Bernstein of Saranac Lake, NY, and I began PsyETA 2 years ago. While the group is independent of the American Psychological Association (APA), all of its present 160 members are also members of APA. For a number of reasons, we felt and continue to feel the need for an independent group within our profession that will concern itself with the ethics of psychology's treatment of animals.

At the time of PsyETA's inception, psychological research was being singled out for criticism on ethical grounds, beyond its proportionate share as but one of the areas of scientific research (e.g., P. Singer's Animal Liberation). For example, it was claimed that psychology had had more than its share of painful experiments (as discussed in J. Diner's Physical and Mental Suffering of Experimental Animals). Within the profession, there was little response or apparent recognition of this criticism, the actual facts of the matter, or the complex ethical issues that had begun to be raised in moral philosophy (e.g., T. Regan and P. Singer, Animal Rights and Human Obligations). While organizing a symposium in 1980 to promote discussion of issues ("The Ethics of Our Treatment of Animals," Bates College), I found few psychologists ready or able to give, from my viewpoint, an adequate account of the interests of the animals utilized in psychological research.

Dr. Bernstein had been monitoring the response to animals protection issues within APA for a number of years. In that period the primary APA committee (CARE) charged with animal welfare concerns was also charged with promoting scientific research. The guidelines published by the committee ("Principles for the Care and Use of Animals," 1971; revised, 1979) were general, vague, brief, and rarely invoked. In his testimony during the congressional hearings on the "Use of Animals" (Subcommittee on Science, Research, and Technology, October 1981), Dr. Perrie Adams, then chairperson of CARE, stated that the committee had received only two allegations of abusive treatment in the past 5 years and that, in both instances, it did not find enough substantial evidence to merit investigation. It had failed to investigate the ethics of Dr. Lester Aronson's work at the Museum of Natural History in New York, a case that was widely aired in popular and scientific media (for example, in "Animal Rights: NIH Cat Sex Study Brings Grief to New York Museum," Science, 1976).

K.J. Shapiro

Unfortunately, events since the formation of PsyETA have dramatically borne out our concerns. The case and trials of Dr. Edward Taub (Int J Stud Anim Prob 3 (3):219, 1983) have been a trial for psychology as well. Two Maryland courts have found Taub guilty under an anti-cruelty statute and NIH has permanently suspended a grant to Taub, but through its Psychology Defense Fund, APA has given Taub awards totaling $16,000 to help pay for his defense. Further, the APA's Ethics Committee exonerated Taub, and the CARE committee is currently preparing a brochure emphasizing the contributions of animal research.

In the light of the largely defensive character of these responses, PsyETA is now renewing its effort to establish an animal protection committee within APA. While this undoubtedly will be a slow process, we have had some encouragement, in that discussions between PsyETA and the extant committees within APA have begun.

Besides organizational reform, PsyETA is working as a force for education. Two examples are (1) a contest to support student theses and independent studies on ethical issues, and (2) a project to encourage authors of introductory texts to add discussions of the ethics of the use of animal subjects in research. Also, we intend to develop a research arm, which would attract funding for research on such pertinent issues as attitudes to animals and alternatives to the use of animals.

Sorting Through the Ethical Issues

In my view, the contribution of psychological research involving animals to our field has been, at best, a mixed one. While not denying the impact of animal studies on the directions the field has taken, given the early choice to employ nonhuman animal subjects for a major portion of research, I have to say that the evaluation of that impact is no simple matter. Of course, even if one were to accept unequivocally that that strategy has borne fruit in terms of increasing our understanding, it is still false to assume that the decision to use extensive animal research was the only or even the most effective path to have taken.

For example, it would have been possible to develop "learning theory" employing human volunteers rather than animal subjects. And isn't it likely that the importance of imagery in the treatments that are, at least arguably, a derivative of learning theory would otherwise have been delimited much earlier, as Drewett and Kani suggest in their article in Animals in Research (D. Sperling, editor)? Or, wasn't the recent "discovery" of the importance of cognition in therapy greatly delayed by the too exclusive use of animals as subjects? Putting ethical questions aside for a moment, the decision in the late nineteenth century to wed experimental psychology to animal-lab research by adopting such strategies as the construction of animal models of human phenomena (as detailed by B. Kuker-Reinicke, in Psychology Experiments on Animals) was certainly not an inevitable one and was, in many ways, unfortunate.

If an evaluation of the contribution and complexity of research in psychology is mixed (a position I can only suggest here) and if at least some nonhuman animals justly deserve moral status and consideration, a conclusion reached by the overwhelming weight of recent arguments in moral philosophy, it follows that the ethical restraints on our use of animals ought to be stringent indeed. To begin to practically and concretely effect those constraints, I would like to see a committee within APA whose primary function and concern would be animal welfare. This standing committee would be charged with establishing and providing guidelines for animal care committees within local research institutions. Such committees would ideally include scientists, technicians, a
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In the final analysis, the level of exploitation of animals that we will countenance is a social decision. However, I have been impressed with philosophy’s role in bringing these particular issues to our attention and in offering further leads as to what our relation to other animals can and ought to be. To complete these remarks, I would like to point to some leads in this philosophical literature which I feel deserve further development.

It has been the tactic of much of this literature to delve into the nature of the boundary that we have set up between human and nonhuman animals—typically, either extending that boundary by critically challenging and then lowering the traditional criteria as to what kind of being is a fit object of moral concern, or by “discovering” that certain animals have had those traditional attributes all along that would let them pass, if not as persons, at least as individuals worthy of our moral consideration. In contrast to this focus, Hans Jonas (in The Phenomenon of Life: Toward a Philosophical Biology, 1966) implies that we might well shift the locus of our operations. In a brilliant chapter entitled “To Move and to Feel,” Jonas directs us away from the defense or mitigation of any supposedly peculiarly human territory to the distinction between animal and plant, in his terms, between “the animate” and “the inanimate.”

He finds that the point of departure of the “phenomenon of animality” from the “vegetative mode of life” resides in a concept of distance. Very briefly, on motility and perception is built the distance or gap between urge and attainment, between desire and satisfaction; and in this deferred fulfillment is the ground for purpose and emotion. Animality, then, is a state of being for which the temporal and spatial distance of objects constitutes a “world,” as distinguished from the plant’s relation to an environment that is merely contiguous with itself. “The suffering intrinsic in animal existence is thus primarily not that of pain…but that of want and fear” (p. 105) as his or her purposes may be frustrated for this animal.

This ontology of animality implies an obligation on the part of scientists to study particular animal species in their natural habitats. Only in this way can we begin to grasp just what it is we deprive them of when we place them in a lab and make them the subjects of our experimentation. A less exploitative and more sensitive ethic must be built on such considerations.

Genetic Adaptation and Welfare

J. Van Rooijen

I. Van Rooijen is with the Department of Animal Husbandry, Agricultural University, Mariëweg 40, 6779 PC Wageningen, The Netherlands.

Introduction

Beilharz (1982) has pointed out that it may be possible to adapt animals genetically to existing husbandry systems, rather than adapt the systems to the animals, in order to improve animal welfare. While I am in fundamental agreement with Beilharz’ way of thinking (Van Rooijen, 1982a), I am afraid that his statements may easily be misunderstood.

Beilharz says: “The evolutionary processes, if they are not obstructed or misdirected, must lead to such a degree of adaptation that welfare will have to be taken for granted, just as we can do no better than to take for granted the welfare of any wild animal in its natural habitat.” From this statement, one might conclude all we have to do is wait, and the animals will eventually adapt to intensive systems. Concerning animals put into new kinds of environments, he states that, if individuals do not have the capacity to adjust phenotypically, “adaptation of the population will require a rapid genetic response to prevent dying out of the population.” This comment may suggest that one does not have to wait very long for the animals to adapt successfully to intensive systems. He also notes that it is likely that a rapid genetic response is accompanied by much suffering. From this, one might conclude that suffering during such a process is only “natural,” and is therefore justified.

Beilharz writes further that the procedure of adaptation “may have to be approached in stages, if the environmental conditions aimed at are radically different from those to which the animals are now adapted.” Because he fails to...
veterinarian, an ethicist, and a person from the animal welfare community. The guidelines would include the provision of a class of experiments that are expressly prohibited on grounds independent of consequentialist or utilitarian considerations. In the British psychologist Dr. Alice Heim’s term, certain experimental procedures are “intrinsically objectionable.” They belong to a category of investigations where ends do not justify the means, where the rights of an individual must trump those of any aggregate—human or otherwise. It would be the responsibility of the local animal care committees to decide what specific proposed research belongs in this category.

If an experimental procedure were deemed permissible on this first ground, it would then be scrutinized on more strictly scientific grounds. Is it “good science”? Does it measure what it purports to? Is any intended extrapolation to human phenomena compelling or reasonable?

Finally, the proposed research would be assessed on utilitarian grounds. Do its potential benefits outweigh its costs? Costs and benefits would include those incurred by nonhuman animals, particularly those involved in the experiment, and the burden to reduce those costs would fall on the scientist proposing the research. It is his or her responsibility to demonstrate that he has considered and explored all possible “alternatives.” If he can first meet the criterion of justifying the particular use of animals that is involved, he must then also demonstrate that he is employing the least intrusive procedure that is likely to obtain the effects he proposes to study.

Implicit in these suggestions is an acceptance of the principle that any proposed experimental procedure is vulnerable to the competing claims of the animal subjects. It requires, a principle long ago accepted with respect to the use of human subjects.

In the final analysis, the level of exploitation of animals that we will countenance is a social decision. However, I have been impressed with philosophy’s role in bringing these particular issues to our attention and in offering further leads as to what our relation to other animals can and ought to be. To complete these remarks, I would like to point to some leads in this philosophical literature which I feel deserve further development.

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tell us whether intensive husbandry systems belong in this last category of environmental conditions, one might conclude that it is not necessary to adapt animals in stages if they are to be kept under intensive conditions.

Therefore, because these statements of Beilharz could be misconstrued to defend the practice of keeping animals under the stress of intensive conditions, under the rationalization that this is part of a long-term rational plan, I want to discuss each of these statements in the following comment.

Are Wild Animals in Nature Happy All the Time?

Beilharz feels that we can take for granted the welfare of any wild animal living in its natural habitat. He writes: "I believe that we can do no better than to assume that welfare of any adapted form of life is guaranteed, i.e., that it does not suffer in its particular environment." This assertion might give rise to the idea that wild animals are happy all the time. However, I do not believe that this idea (which seems to be inspired by Rousseau) is correct. In fact, wild animals are sometimes compelled to fight with rivals for food, sexual partner, nest site, etc.; they may return to find their nests empty because their young have been killed by a predator; they may have to endure lengthy periods of bad weather, and so on.

Among some species of fish, each female lays, during her lifetime, millions of eggs. In steady-state populations, only two individuals out of all of her offspring (on average) will have the opportunity to reproduce again. We can assume that many of the other individuals that do survive to reproduce will be likely to suffer for shorter or longer periods of time. Lorz (1973, cited in Van Putten, 1981) has defined the welfare of an animal as: "Living in harmony with the environment and with itself, both physically and psychologically." I agree with Beilharz that, if animals are living in an environment into which they fit, and with which they are in harmony, we may assume that they experience a certain degree of welfare. But even adapted forms are not always in harmony with the environment to which they are adapted; harmony and adaptation must be construed as two separate parameters.

Is Reproduction the Same as Welfare?

Beilharz cites van Esch, who has written the environment tests but not of adaptation to an environment is reproduction. Beilharz writes: "There is no doubt that, on basis of this criterion, there are poultry and pigs that are quite well adapted to intensive farming."

Indeed, reproduction offers a good index for comparing the adaptedness of individuals within a population but, at the same time, one must recall that this is a quite different concept from the idea of harmony. The term "adapted animals," when used in this sense, does not mean animals that are in harmony with their environment and themselves but, rather, that animals simply show a high degree of fitness. Fitness and welfare often coincide, but a one-for-one overlap is not necessarily the case (Dawkins, 1979, Van Rooijen, 1982). An example will serve to make this clearer. One may compare two bulls, one ranging free on an island with some cows, and one kept under very adverse circumstances—but from the latter, each sperm is used for artificial insemination. The reproduction rate of the second bull is obviously much better than that of the first one, but, with respect to their welfare, the reverse is true.

Beilharz writes: "In fact, if we could free ourselves of our human prejudices and take a broad perspective, we would find that in evolution, the interaction of domesticated animals with humans has been a very successful form of symbiosis, because neither human beings nor domestic animals would be present in the same huge numbers without the others." This sentiment suggests that, if we permit ourselves to take a very narrow perspective instead, and do not free ourselves from our human prejudices, we would find that the human-domestic animal symbiosis had been very unsuccessful, because so many animals are suffering.

In actuality, there is merely an apparent contradiction in Beilharz' thinking. The fact that, biologically, domestic animals have been very successful does not exclude the possibility that this success may go hand in hand with suffering in many animals.

Is Suffering During the Process of Adaptation "Natural"?

Beilharz states: "The evolutionary processes, if they are not obstructed or misdirected, must lead to such a degree of adaptation that welfare must be taken for granted. But he also writes that it is very likely that these processes of adaptation are accompanied by much suffering. These assertions may give the impression that suffering during the process of adaptation is "natural."

Rapid changes in forms of life after a rapid change in the environment have actually been rare during evolution. Rather, rapid changes in the environment of a species has most often resulted in an extinction of that species. Only a few species have survived rapid changes, not because they also managed to change rapidly, but largely because they already possessed certain traits that allowed them to remain unaffected by the new change in the environment. Also, most of the changes in the various forms of life have occurred only very slowly. They are often the result of a continuous interaction between two species, for instance, a predator and a prey species, or a parasite and a host. During such an interaction, both species continuously adapt themselves to each other over long periods of time. Further, changes in the abiotic environment, that have occurred gradually (for instance, alterations in climate), may explain the evolution of some species.

We must realize, too, that adaptation processes are still at work in wild animals that are living in their natural habitats, animals whose welfare Beilharz assumes is guaranteed. This situation has existed for long periods during the evolutionary history of each species. Therefore, I doubt whether, in the greater portion of the history of life on earth, animals have suffered more during adaptation than do present-day animals in natural habitats.

Is Suffering During the Process of Adaptation Ethically Justified If It Turns Out to Be "Natural"?

Some predators kill their prey in a way that would give rise to considerable opposition if this method were to be practiced by humans. What we find acceptable in nature is not always held to be equally acceptable in relation to the animals that are placed under our care. Therefore, because nature can never be held up as our ultimate ethical standard, it does not really matter whether suffering during adaptation occurs in nature or not.

Does a New Environment Induce a Rapid, Genetic Change?

Beilharz states that if we put animals into a new environment, this change will necessitate a rapid genetic response to prevent a dying out of the entire population. This statement is teleological: it implies that putting animals under intensive husbandry conditions will of necessity induce rapid genetic adaption. Therefore, since the period of suffering that occurs during this adaptation is of brief duration, it can be asserted that this treatment is ethically acceptable. However, this view of things is Lamarc-
tell us whether intensive husbandry systems belong in this last category of environmental conditions, one might conclude that it is not necessary to adapt animals in stages if they are to be kept under intensive conditions.

Therefore, because these statements of Beilharz could be misused to defend the practice of keeping animals under the stress of intensive conditions, under the rationalization that this is part of a long-term rational plan, I want to discuss each of these statements in the following comment.

Are Wild Animals in Nature Happy All the Time?

Beilharz feels that we can take for granted the welfare of any wild animal living in its natural habitat. He writes: "I believe that we can do no better than to assume that the welfare of any adapted form of life is guaranteed, i.e., that it does not suffer in its particular environment." This assertion might give rise to the idea that wild animals are happy all the time. However, I do not believe that this idea (which seems to be inspired by Rousseau) is correct. Indeed, wild animals are sometimes compelled to fight with rivals for food, sexual partner, nest site, etc.; they may return to find their nests empty because their young have been killed by a predator; they may break a leg in an accident; they may have to endure lengthy periods of bad weather, and so on.

Among some species of fish, each female lays, during her lifetime, millions of eggs. In steady-state populations, only two individuals out of all of her offspring (on average) will have the opportunity to reproduce again. We can assume that many of the other individuals that do survive to reproduce will be likely to suffer for shorter or longer periods of time. Lorz (1973, cited in Van Putten, 1981) has defined the welfare of an animal as: "Living in harmony with the environment and with itself, both physically and psychologically." I agree with Beilharz that, if animals are living in an environment into which they fit, and with which they are in harmony, we may assume that they experience a certain degree of welfare. But even adapted forms are not always in harmony with the environment to which they are adapted; harmony and adaptation must be construed as two separate parameters.

Is Reproduction the Same as Welfare?

Beilharz cites Exchaz, who has written: "The process of adaptation to an environment is reproduction. Beilharz writes: "There is no doubt that, on basis of this criterion, there are poultry and pigs that are quite well adapted to intensive farming."

Indeed, reproduction offers a good index for comparing the adaptedness of individuals within a population but, at the same time, one must recall that this is a quite different concept from the idea of harmony. The term "adapted animals," when used in this sense, does not mean animals that are in harmony with their environment and themselves but, rather, that animals simply show a high degree of fitness. Fitness and welfare often coincide, but a one-for-one overlap is not necessarily the case (Dawkins, 1979; Van Rooijen, 1982). An example will serve to make this clearer. One may compare two bulls, one ranging free on an island with some cows, and one kept under very adverse circumstances — but from the latter, each sperm is used for artificial insemination. The reproduction rate of the second bull is obviously much better than that of the first one, but, with respect to their welfare, the reverse is true.

Beilharz writes: "In fact, if we could free ourselves of our human prejudices and take a broad perspective, we would find that in evolution, the interaction of domestic animals with humans has been a very successful form of symbiosis, because neither human beings nor domestic animals would be present in the same huge numbers without the others." This sentence also suggests that, if we permit ourselves to take a very narrow perspective instead, and do not free ourselves from our human prejudices, we would find that the human-domestic animal symbiosis had been very unsuccessful, because so many animals are suffering.

In actuality, there is merely an apparent contradiction in Beilharz thinking. The fact that, biologically, domestic animals have been very successful does not exclude the possibility that this success may go hand in hand with suffering in many animals.

Is Suffering During the Process of Adaptation "Natural"?

Beilharz states: "The evolutionary processes, if they are not obstructed or misdirected, must lead to such a degree of adaptation that welfare must be taken for granted. But he also writes that it is very likely that these processes of adaptation are accompanied by much suffering. These assertions may give the impression that suffering during the process of adaptation is "natural."

Rapid changes in forms of life after a rapid change in the environment have actually been rare during evolution. Rather, rapid changes in the environment of a species have most often resulted in an extinction of that species. Only a few species have survived rapid changes, not because they also managed to change rapidly, but largely because they already possessed certain traits that allowed them to remain unaffected by the new changes in the environment. Also, most of the changes in the various forms of life have occurred only very slowly. They are often the result of a continuous interaction between two species, for instance, a predator and prey, or a parasite and a host. During such an interaction, both species continuously adapt themselves to each other.

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Is a Conventional Husbandry System the Natural Environment of a Domestic Animal?

To determine to what kinds of environments domestic animals have become adapted, I will list some characteristics of one selected species: the pig. Because pigs easily become feral (Hanson and Karstad, 1959; Pullar, 1953), I will also mention some of the characteristics of wild swine.

That pigs are adapted to environments that provide much more space and variety than most conventional systems have to offer is indicated by some data furnished by Wood (1865), cited in Reiber, 1969). One person rode 4½ miles in 1 hour on a boar, and another person drove 4 miles with a four-in-hand of sows. A wild boar jumped over a wall of 9 feet, and a domestic pig scaled one of 4½ feet. Their desire for variety is also indicated by the fact that pigs prefer some substrate over a bare concrete floor, and that their preference for different substrates may show a diurnal rhythm (Van Rooijen, 1961). Meynhardt (1980) related how pigs are kept by the fishermen of the Donaudelta. After a training period of 2 months, in which they are taught to listen to a call or whistle, these pigs are left free to range over the Donaudelta. They soon become completely feral and are very difficult to approach. Yet in December, the pigs are piloted home by use of the call or whistle. During the last 1 to 2 miles, these pigs swim behind the boats and then enter their pens without coercion. Pigs also easily learn to open a gate by pressing on a plate with their nose (Van Rooijen, 1983). But conventional systems make little use of the actual capacities of pigs.

Although some authors have supposed that pigs have poor sight (Ackerknecht, 1950; Mellen, 1950), more recent research has shown, on the basis of morphological (Beauchemin, 1974) and behavioral (Klopper, 1966) data, that the pig eye is very much like the human eye. Olfaction, however, is even better developed than in humans: domestic pigs are able to follow human tracks (Reiber, 1969). For wild pigs, this is said to be true even if the tracks are several hours old (Snethlage, 1957). And most people know that domestic pigs are used to locate truffles (Reiberre, 1967). Also, the sense of hearing is better developed in pigs than in humans. Meynhardt (1980) describes how wild swine were able to localize acorns in the dark, without searching, solely on the basis of the sound generated when the acorns hit the ground. He further described how these swine, in the dark, removed the shells of the acorns.

In conventional systems, pigs are often given only pellets to eat. But in nature, wild swine eat a wide variety of food (roots, the green parts of plants, fruits, and small animals) and are described as connoisseurs: swine prefer certain types of potatoes over other types, and they like acorns most of all, but will eat American acorns only when there are no European acorns left (Meynhardt, 1980). Hunters ascribe to wild swine an "almost humanlike logical ability" (Snethlage, 1957) or at least an intellectual capacity equal to that of the red deer (Kiesling, 1925). Verkes and Coburn (1975) stated that domestic pigs had "an approach to free ideas" that these research workers had not in any way expected. The intelligence of domestic pigs is often said to be comparable to that of dogs (Ackerknecht, 1950; Mellen, 1950). The capabilities of pigs are also demonstrated by the fact that wild boars are used as bloodhounds (Guman Singh, 1956) and domestic pigs as gundogs (Zeuner, 1963). Many more facts about pigs could be mentioned, but my aim here has been to indicate that there exists a considerable gap between the nature of the niche to which pigs are actually adapted and the environment found in conventional husbandry systems.

One may argue that most of these data are derived from wild swine or uncommon breeds, and are therefore of less value with respect to pigs kept in conventional systems. Of course, I have noted some extraordinary cases, and I do not doubt that domestication has influenced pigs (Van Rooijen, 1983a). But the thousands of years of domestication are negligible when compared with the great span of time over which evolutionary changes have occurred. Even those changes that, on the evolutionary scale, are considered rapid took more time than did domestication. Therefore, I do not believe that we may consider conventional husbandry systems as natural environments of the domestic pig.

Is the Attempt to Adapt Pigs to Intensive Husbandry Systems, in the Same Degree as Pigs Are Adapted to Conventional Systems, Realistic?

At this point, the descendants of the first intensively kept pigs have lived at most, for some 10 years under intensive conditions. This amount of time equals nothing compared with the number of years that pigs have had the potential to adapt to conventional systems. However, selection of these pigs, with respect to the characteristic of harmony with the environment, has been unconscious. Perhaps we can reach our goal sooner by conscious selection. But at the same time we must keep several points in mind.

1. We must be careful not to select only against particular symptom traits. For instance, if we try to select against tail-biting, it may turn out that we have selected for blindness which, in this case, amounts to a somewhat perverse way of turning out the light. This sort of danger is also present in our attempts to adapt husbandry systems to the animals but, because it is common in behavioral genetics to select on the basis of just one clearly defined parameter, the threat is far greater in selection experiments. Therefore, we should combine selection experiments with intensive ethological and physiological investigations of the animals under selection.

2. In genetics, selection is done mostly on the basis of only a small number of isolated parameters. Selection on this principle involves the danger that the selected animals may no longer be in harmony with themselves. For instance, if we select for large eggs, we do not simultaneously select (consciously) for a larger cloaca width. This practice may therefore cause a lot of suffering. To keep animals in harmony with themselves, we have to select for many traits at the same time. However, this procedure may interfere with production charac-
In contrast, the neo-Darwinistic view holds that if populations enter a new environment, the speed of their adaptation will differ solely according to random chance; only those populations that serendipitously attain a high degree of fitness to the new environment will survive.

In nature, as a rule, the fitness of those individuals that are more in harmony with their environment than others will be greater than the fitness of individuals that are less in harmony with their environment. In artificial situations, however, it is possible that animals will continue to survive, even though they have not yet truly adapted in the sense of living in harmony with their environment. This last point is important in regard to the question of suffering. We simply do not know beforehand how long it will take for domestic animals to become sufficiently adapted to intensive systems such that they not only survive, but are also in harmony with these environments.

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At this point, the descendants of the first intensively kept pigs have lived at most, for some 10 years under intensive conditions. The life span of pigs is much shorter than that of humans, so that the potential to adapt to conventional systems is greater than that of humans. Yet we may argue that most of these data are derived from wild swine or uncommon breeds, and are therefore of less value with respect to pigs kept in conventional systems. Of course, I have noted some extraordinary cases, and I do not doubt that domestication has influenced pigs (Van Rooijen, 1982a). But the thousands of years of domestication are negligible when compared with the great span of time over which evolutionary changes have occurred. Even those changes that, on the evolutionary scale, are considered rapid took more time than did domestication. Therefore, I do not believe that we may consider conventional husbandry systems as natural environments of the domestic pig.
tistics. A parallel example is that of many companion animal species: selected traits often interfere with the normal functioning of the animals. Our goal may be too ambitious. One may be impressed by the diversity in form and behavior of, for example, domestic dogs. However, closer investigation shows that all of the behavioral elements of these domestic species were already present in their wild ancestor, but that varying aspects are differentially emphasized in the various breeds. As discussed above, there is a wide gap between the natural environments of pigs and conventional rearing systems. And the gap between conventional and intensive systems seems to me to be much larger. Pigs are rooting specialists, but when kept under intensive conditions, no substrate is provided for them to root in. It is not surprising, then, that under these intensive conditions many pigs exhibit behavior patterns that closely resemble those of psychiatric patients. On the basis of extrapolation from our own feelings, we can assume that the suffering of such animals is intense (Van Rooijen, 1981a). Our attempt to select pigs that are adapted to intensive husbandry systems, to the same degree that pigs are adapted to conventional systems, may be more like an attempt to select a duck out of a pigeon than selecting a collie out of a wolf.

My conclusion is that we must first perform small-scale experiments and gather sufficient information to see whether our goal is realistic.

What Do Pigs That Are Adapted to Intensive Husbandry Systems Look Like?

Pigs kept intensively must prefer pellets over acorns and, for the entire day, they must prefer a bare, slatted floor over one of straw. Of all species, the niche of an intensively kept pig is therefore perhaps most comparable to that of the storage ants of Myrmecocystus. The bodies of these insects are enormously distended from fluid food reserves that are stored in their crops, and they are permanently confined to the nest. Other members of the colony tap them for food, by inducing them to regurgitate (Eisner and Wilson, 1975). In many respects, humans keep the environment of the intensive-husbandry pig constant in the same way. Therefore, we can consider the situation of these pigs similar to that of those parasites that have lost many of their capacities, because they can rely on the homeostatic mechanisms of their hosts. We may expect that, when pigs have become totally adapted to life in intensive husbandry systems, they will show many traits in common with internally parasitic animals. Although it is theoretically possible to adapt pigs to such an extreme extent, it is clear that this endeavor is more unrealistic than the attempt to adapt them to a degree similar to that of pigs adapted to conventional systems.

Final Remarks

One has to keep in mind that we are successfully preventing the wholesale demise of the domestic animals living under intensive conditions. And we may assume that, never before in evolution, have there been animals so disturbed that they perform behavior patterns, comparable to those of psychiatric patients, that were nevertheless able to stay alive and breed successfully. In our intensive systems, this is made possible only because we are assisted by various techniques (e.g., regular food distribution, artificial insecimation, flat decks, etc.). This means that, in this situation, it is not likely that fitness and welfare coincide. I do not understand what Beilharz meant when he wrote about “obstructed and misdirected evolutionary processes” because, from the viewpoint of evolution, all directions are neutral. But if one wants to use these terms, the care and protection we give to animals may be considered as a form of evolution that is “obstructed and misdirected,” inasmuch as their final consequence is that fitness and welfare do not coincide.

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Finally

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References


The Behavior of Confined Calves Raised for Veal: Are These Animals Distressed?

M. Kiley-Worthington

M. Kiley-Worthington is with the Ethology and Neurophysiology Group, School of Biological Sciences, University of Sussex, Falmer, Brighton, England.

The behavior of 12 calves confined in crates was recorded at 1-minute intervals for 12-hour periods. These recordings were made at fortnightly intervals from approximately 2 to 16 weeks of age. In all, 864 hours of observations were recorded.

The activities that were performed and the amount of time spent doing each are outlined. Circadian rhythms were controlled largely by feeding time, although there was a difference between diurnal and nocturnal behavior. Individual calves varied in how they adapted to the restricted environment. Individual personality profiles and data on the ontogeny of behavior under these conditions are presented.

At 10 weeks of age, the calves were transferred to a different shed, where they were further restricted and yoked. This had a significant effect on most behaviors. The remaining 3 to 4 hours are spent grooming, playing, investigating the environment, and in social interactions. The remaining 3 to 4 hours are spent "idling": standing about inactive.

A restrained and confined calf that is individually housed cannot move about, nor interact with its conspecifics in a normal way. It has its food presented to it and thus spends much less time looking for it. Often, the food is provided in a form that allows very rapid consumption (e.g., liquid feeds and concentrates such as grains and chopped dried grass). Similarly, the food presented to cattle under modern agricultural conditions is often much lower in fiber than were their original natural diets. This reduces the amount of time that must be spent ruminating in order to digest it. For these reasons, the animals spend less time on behavior related to feeding. What then do they do with the "extra" time available? In some animals and humans, stereotypies may develop (Meyer-Holzapel, 1968; Duncan and Wood-Gush, 1974; Kiley-Worthington, 1977), or other abnormal behavior such as an increase in aggression (Kiley-Worthington, 1977). Other species, such as swine, may spend more time sleeping (R. Ewbank, pers. comm., 1979).

In bovids, daily rhythms are largely controlled by sunrise and sunset (see, e.g., Hughes and Reid, 1951). When these cues are reduced in darkened buildings, one can investigate whether circadian rhythms persist and what, if anything, becomes light controls them.

The ontogeny of behavior of calves kept in restricted environments might also be expected to be different from that of mother-raised calves in the field. The questions addressed in this paper are, therefore: (1) How do calves from 2 to 16 weeks of age, a period of rapid physical and behavioral growth, adapt to the conditions of severe physical and social confinement? (2) How does this affect behavioral ontogeny? (3) What do they do with their "extra" or spare time? (4) How much individual variation can be found in their behavior?

An important reason for this work is a concern for animal welfare and the de-
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At 10 weeks of age, the calves were transferred to a different shed, where they were further restricted and yoked. This had a significant effect on most behaviors. The redistribution of time for the confined and restricted calves, as compared with calves who remain with mothers in fields, is discussed, along with other aspects of welfare. Seven possible criteria related to behavioral distress (defined in functional terms) are suggested and discussed in relation to these results.

Zusammenfassung


Introduction

Cattle spend much of their time searching for food, eating, and ruminating (about 12.5 hours per day; Hafez and Schein, 1962). The exact amount of time spent grazing depends, to an extent, on forage availability (Hardison et al., 1954), although this variable may not be as important as was originally thought (e.g., Lancashire and Keogh, 1966). Rumination depends on the characteristics of the forage, particularly the amount of fiber (Gordon, 1958). Kiley-Worthington and de la Plain (1983) found that cattle at pasture spent approximately 8 hours per day sleeping (lying with the eyes closed). This finding confirms Ruckenbusch and Bell's (1970) results with stalled animals. In addition, ½ hour a day is spent grooming, playing, investigating the environment, and in social interactions. The remaining 3 to 4 hours are spent "idling": standing about inactive.

A restrained and confined calf that is individually housed cannot move about, nor interact with its conspecifics in a normal way. It has its food provided in a form that allows very rapid consumption (e.g., liquid feeds and concentrates such as grains and chopped dried grass). Similarly, the food presented to cattle under modern agricultural conditions is often much lower in fiber than were their original natural diets. This reduces the amount of time that must be spent ruminating in order to digest it. For these reasons, the animals spend less time on behavior related to feeding. What then do they do with the "extra" time available? In some animals and humans, stereotypes may develop (Meyer-Holzapfel, 1968; Duncan and Wood-Gush, 1974; Kiley-Worthington, 1977), or other abnormal behavior such as an increase in aggression (Kiley-Worthington, 1977). Other species, such as swine, may spend more time sleeping (R. Ewbank, pers. comm., 1979).

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An important reason for this work is a concern for animal welfare and the de-
Veal calves in Europe are raised in restricted, and this constriction increases as they grow. This particular system for raising calves has perhaps engendered more public concern on ethical grounds than any other recent development in intensive animal husbandry. Most veterinarians, ethologists, and philosophers, as well as others concerned with animal husbandry, will agree that obvious signs of physical ill-health cannot be the only criterion for assessing “cruelty” (e.g., Brambell, 1963; Ekesbo, 1978; Folsch, 1978; Singer, 1976; Dawkins, 1980). One approach to assessing whether an environment is acceptable to the animal is to allow it to choose its environment (e.g., Dawkins, 1977; Duncan, 1978; Dawkins, 1980). However, a more pragmatic approach is to assess to what extent the behavior of the animal in the confined environment differs from that of field-living animals. It is possible that some behavioral abnormalities could be used as an index of psychological ill-health (for example, stereotypes such as persistent self-grooming—Kiley-Worthington, 1977) and, hence, of “distress.” These indicators could then serve as guidelines for what limits should be placed on permissible husbandry conditions.

By comparing the data presented here, from detailed studies on confined veal calves, with that from mother-reared, field-living calves, it is possible to derive some guidelines as to the extent to which the behavior of the confined calves differs.

Methods

The calves were fed an artificial milk-substitute diet twice a day, at approximately 6.30 and 19.00 hours. They received 1.5 liters at each feeding when they came into the unit, and this increased to 6 to 8 liters before they left. No water was available for them to drink. The younger calves were given approximately 1 to 1.5 kg of straw per day; the older calves were provided approximately 500 g each. The urine and feces mostly fell through the slats onto the concrete floor, where it was swept down the drain by a high-pressure hose and boded after the morning feed. The shed smell strongly of urine and feces to all of the humans who entered it. The humidity was always high because of the daily wetting of the floor.

Observations were made by two observers, who each watched 6 calves from a central gangway. Observations were begun at 13.00 hours and continued until 30 minutes or more after the evening feeding time (18.30 to 19.00 hours). They began again at 06.30 to 07.00 hours on the following morning and continued until 13.00 hours. The activities performed by each of the 12 calves were recorded once a minute by using a small timing device that gave an audible pulse every 10 seconds.

These recordings were repeated at 14-day intervals. Thus, 4 observational days were completed in shed 1, and 2 in shed 2. In addition, one 24-hour observational period was completed on six animals. In this way, a total of 69,120 observations were recorded in 96 observation hours. Because of the number of observations employed and the close time interval used in recording them, relatively infrequent events such as calling, moving around, licking the neighbor, etc., were recorded sufficiently often to allow for statistical treatment. The detailed analysis was done on a computer using the SPSS package (Nie et al., 1975). The statistical tests used were the t-test, the Kolmogorov-Smirnov two-sample test, and analysis of variance (Siegel, 1956), as indicated in the figures.

Results

Behaviors Performed

Table 1 gives a list of all the activities recorded and definitions for each.

The Time Spent in the Various Activities

The time spent engaged in the various activities is shown in Table 2. This represents an average for the 12 calves.

The confined calves spent an average of 5.1 minutes/hour chewing on the wood fitments; they also managed to lick each other’s noses for short periods (0.05 minutes/hour). The time spent moving around was, to some extent, related to their size. Thus, in the first month they were able to turn around, but not thereafter (see the section “Differences Between the Two Sheds,” below).

If all the activities occurred for relatively short periods, such as licking, chewing, sniffing, calling, itching, sucking, and playing, these are summed (“other” activities, Table 1), we see that they then take up a considerable amount of time (12.5 minutes/hour).

Circadian Rhythms

Figures 1 and 2 show the frequency of the principal maintenance activities of the confined calves during one full 24-hour period. There is a difference between behavior that occurred during the day and that during the night. Most of the sleep was done at night, while during the day the calves were very active and showed a marked diurnal rhythm (Fig. 2).

During the day, between the two feeding times, the animals remained relatively inactive. However, the evening feeding appeared to be anticipated for periods of up to an hour—the animals became very active, getting up and performing activities related to feeding, such as licking and chewing objects.

Individual Differences in Behavior Between Confinement Calves

Figure 3 shows the variation in behavior among a sample of five calves. Calf 17 lay down and slept more; “ticked” (rubbing, scratching and licking of self), called, licked objects, chewed, and sniffed less than the average. It also paid less at-
Veal calves in Europe are raised in individual crates and usually fed exclusively on liquid milk-substitute. Often, diets are also low in iron, in order to ensure the palest flesh. This particular system for raising calves has perhaps engendered more public concern on ethical grounds than any other recent development in intensive animal husbandry. Most veterinarians, ethologists, and philosophers, as well as others concerned with animal husbandry, will agree that obvious signs of physical ill-health cannot be the only criterion for assessing "cruelty" (e.g., Brambell, 1963; Ekesbo, 1978; Folsch, 1976; Singer, 1976; Dawkins, 1980). One approach to assessing whether an environment is acceptable to the animal is to allow it to choose its environment (e.g., Dawkins, 1977; Duncan, 1978; Dawkins, 1980). However, a more pragmatic approach is to assess to what extent the behavior of the animal in the confined environment differs from that of field-living animals. It is possible that some behavioral abnormalities could be used as an index of psychological ill-health (for example, stereotypes such as persistent self-grooming—or "distress." These indicators could then serve as guidelines for what limits should be placed on permissible husbandry conditions.

By comparing the data presented here, from detailed studies on confined veal calves, with that from mother-reared, field-living calves, it is possible to derive some guidelines as to the extent to which the behavior of the confined calves differs.

Methods

The calves were brought into the commercial veal unit where the study was done at 1 to 2 weeks of age. Eleven Friesian bull calves and one heifer were the subjects of the detailed study. They stayed in the unit for approximately 14 weeks, when they were loaded into lorries and taken to the abattoir. However, at 10 weeks they were moved from one veal shed to a second with a slightly different set-up (see below). This commercial unit was run according to recommendations made by the Ministry of Agriculture, Fisheries and Food, and within the limits of the Welfare Codes of Practice (1974).

The unit was organized into two sheds holding 40 crates each. Each crate measured 1 by 2 meters. There was one long window (2 meters by ½ meter, and 2½ meters high). The temperature was controlled by heaters and fans and maintained at around 40°C. The natural light in the sheds was dim (too dark to read by), except at feeding times, when the overhead fluorescent lights were switched on. Recordings were made with the aid of a red 60-watt bulb located near the observers. In the first shed (the nursery shed), the calves were bedded on straw on top of slats, and could turn around, groom themselves, eat, and lay back the straw. In the second shed (shed 2), they were tethered by the neck and were unable to turn around, lie, or scratch their rumps. In this shed, they stood directly on the wooden slats with no bedding. The back of the pen was open. They could therefore step back and fall off the slats with their hind legs.

The calves were fed a milk-substitute diet twice a day, at approximately 6.30 and 19.00 hours. They received 1.5 liters at each feeding when they came into the unit, and this increased to 6 to 8 liters before they left. No water was available for them to drink. The younger calves were given approximately 1 to 1.5 kg of straw per day; the older calves were provided approximately 500 g each. The urine and feces mostly fell through the slats onto the concrete floor, where it was swept down the drain by a high-pressure hose and broom after the morning feeding. The shed smell strongly of urine and feces to all of the humans who entered it. The humidity was always high because of the daily wetting of the floor.

Observations were made by two observers, each watched 6 calves from a central gangway. Observations were begun at 13.00 hours and continued until 30 minutes or more after the evening feeding. Observations were begun at 06.30 to 07.00 hours on the following morning and continued until 13.00 hours. The activities performed by each of the 12 calves were recorded once a minute by using a small timing device that gave an audible pulse every 10 seconds. These recordings were repeated at 14-day intervals. Thus, 4 observational days were completed in shed 1, and 2 in shed 2. In addition, one 24-hour observational period was completed on six animals. To this way, a total of 69,120 observations were recorded in 96 observation hours. The time spent in the various activities related to feeding, such as licking, chewing, and swallowing, was summed ("other" activities, Table 1), we see that they then take up a considerable amount of time.

Circadian Rhythms

Figures 1 and 2 show the frequency of the principal maintenance activities of the confined calves during one full 24-hour period. There is a difference between behavior that occurred during the day and that occurring at night. Most of the sleep was done at night, while during the day lying was often combined with ruminating. Although the lighting was at all times dim, it varied to some extent between day and night. However, it is clear that feeding times influence these activity cycles strongly. The periods of highest activity were focused around the two feeding times, when standing was most frequent, as were "other" activities, such as licking, calling, chewing, and behaviors directed at objects and neighbors (Fig. 1).

During the day, between the two feeding times, the animals remained relatively inactive. However, the evening feeding appeared to be anticipated for periods of up to an hour—the animals became very active, getting up and performing activities related to feeding, such as licking and chewing objects.

Results

Behaviors Performed

Table 1 gives a list of all the activities recorded and definitions for each.

The Time Spent in the Various Activities

The time spent engaged in various activities is shown in Table 2. This represents an average for 12 calves. The confined calves spent an average of 5.1 minutes/hour chewing on the wood fittings; they also managed to suck each other's noses for short periods.
tention to other objects, but more to its neighbors. Calf 19, on the other hand, lay down and slept less, and filled up the time by kicking, chewing, calling, itching, and paying attention to objects. Calf 12 also sniffed and "itched" itself more; it lay down less and paid more attention to its neighbors.

### TABLE 1 Activities Scored for Confined and Field Calves and Their Definitions

<table>
<thead>
<tr>
<th>Activity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand</td>
<td>Standing still on all four legs.</td>
</tr>
<tr>
<td>Lie</td>
<td>Lying either in fetal position or flat on side.</td>
</tr>
<tr>
<td>Sleep</td>
<td>Lying with eyes closed and head lowered to ground or on front legs. Not scored for field calves.</td>
</tr>
<tr>
<td>Move</td>
<td>Movement of the whole body back or forward in crate, or movement of all four legs in sequence. For field calves, different paces recorded.</td>
</tr>
<tr>
<td>Drink</td>
<td></td>
</tr>
<tr>
<td>Urinate</td>
<td></td>
</tr>
<tr>
<td>Defecate</td>
<td></td>
</tr>
<tr>
<td>Eat</td>
<td></td>
</tr>
<tr>
<td>Ruminate</td>
<td>Chewing of regurgitated food from the rumen.</td>
</tr>
<tr>
<td>Suck</td>
<td>Distinct sucking motion of mouth and lips. Only recorded in field calves when suckling mammary.</td>
</tr>
<tr>
<td>Lick</td>
<td>Repeated tongue movement over object/animal. Can lick self, objects, or neighbor, and for field calves, mothers.</td>
</tr>
<tr>
<td>Chew</td>
<td>Jaws placed around object/animal and teeth applied. Can be chewing self or object.</td>
</tr>
<tr>
<td>Sniff</td>
<td>Rapid inspirations and expirations with nose moved toward object/animal. Can sniff neighbor, object or, for field calves, mother.</td>
</tr>
<tr>
<td>Call</td>
<td>(1) Vocal noise with mouth shut, (2) &quot;mm&quot; call, (3) Two or three syllable vocal noise with mouth open of greater amplitude than &quot;mm&quot;, (4) &quot;mm&quot; call.</td>
</tr>
<tr>
<td>Head toss</td>
<td>Vertical upward movement of head over back; often accompanied by rapid expiration.</td>
</tr>
<tr>
<td>Head shake</td>
<td>Lateral repeated movement of head.</td>
</tr>
<tr>
<td>Kick</td>
<td>One or both hind legs lifted up and rapidly kicked backward.</td>
</tr>
<tr>
<td>Rub</td>
<td>A repeated rubbing of any part of the body against another animal or object.</td>
</tr>
<tr>
<td>Self-grooming</td>
<td>Licking, rubbing, and chewing self.</td>
</tr>
<tr>
<td>Play</td>
<td>All four legs off ground within 1 second.</td>
</tr>
<tr>
<td>&quot;Other&quot; activities</td>
<td>Chew, sniff, call, &quot;itch,&quot; and play.</td>
</tr>
<tr>
<td>&quot;Self directed&quot;</td>
<td>All self-directed activities.</td>
</tr>
<tr>
<td>&quot;Social contact&quot;</td>
<td>All activities directed at other individuals.</td>
</tr>
<tr>
<td>&quot;Object directed&quot;</td>
<td>All object-directed activities.</td>
</tr>
<tr>
<td>&quot;Itch&quot;</td>
<td>Scratch, head-toss, head-shake, and kick.</td>
</tr>
</tbody>
</table>

The other profiles presented in Fig. 3 show that the animals varied in many ways. At one end of the continuum were those that adapted to the confined and restricted environmental conditions by lying and sleeping more (e.g., calves 10 and 17). At the other end were those that apparently adapt by "self-stimulation" of one form or another (e.g., calves 12, 19, 21), while others directed it to their neighbors (e.g., 17) and still others to objects in their environment (e.g., 19 and 21).

### TABLE 2 Time Spent in the Different Activities for Confined Calves*

<table>
<thead>
<tr>
<th>Activity</th>
<th>X Minutes/hour</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lie</td>
<td>38.3</td>
<td>32.2</td>
</tr>
<tr>
<td>Stand</td>
<td>3.75</td>
<td>30.2</td>
</tr>
<tr>
<td>Eat</td>
<td>3.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Move</td>
<td>1.25</td>
<td>0.41</td>
</tr>
<tr>
<td>Ruminate</td>
<td>7.8</td>
<td>17.79</td>
</tr>
<tr>
<td>Self-groom</td>
<td>2.3</td>
<td>3.14</td>
</tr>
<tr>
<td>Suck</td>
<td>0.05</td>
<td>0.013</td>
</tr>
<tr>
<td>Object-directed sniffing</td>
<td>1.75</td>
<td>0.94</td>
</tr>
<tr>
<td>Social contact</td>
<td>0.2</td>
<td>0.08</td>
</tr>
<tr>
<td>Play</td>
<td>2.3</td>
<td>0.80</td>
</tr>
<tr>
<td>Chew</td>
<td>5.1</td>
<td>0.94</td>
</tr>
<tr>
<td>Call (mean number of times per hour)</td>
<td>0.25</td>
<td>0.05</td>
</tr>
<tr>
<td>&quot;Other&quot; activities</td>
<td>12.5</td>
<td>4.84</td>
</tr>
<tr>
<td>Sleep</td>
<td>9.8</td>
<td>18.39</td>
</tr>
</tbody>
</table>

*Average duration of confinement, 14 weeks; total number of hours over which observations were made, 96; number of calves, 12; frequency of observation, every minute; total number of observations, (69,120).
tention to other objects, but more to its neighbors. Calf 19, on the other hand, lay down and slept less, and filled up the time by kicking, chewing, calling, itching, and paying attention to objects. Calf 12 also sniffed and “itched” itself more; it lay down less and paid more attention to its neighbors.

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</tr>
<tr>
<td>Drink</td>
<td></td>
</tr>
<tr>
<td>Urinate</td>
<td></td>
</tr>
<tr>
<td>Defecate</td>
<td></td>
</tr>
<tr>
<td>Eat</td>
<td></td>
</tr>
<tr>
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<td>Suck</td>
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<td>Chew, sniff, call, &quot;itch,&quot; and play.</td>
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The Ontogeny of Behavior

Figure 4 shows the trends in the amount of time spent in performance of several different behaviors for the confined calves during their stay in the unit, and also whether this was significant. It shows whether there were significant trends in the same behaviors in a study on calves raised with their mothers in a field (Kiley-Worthington and de la Plain, 1983).

Lying. The confined calves showed a significant decrease in the amount of time spent lying down with age (Kolmogorov-Smirnov two-sample test, P = 0.05). This was due, at least in part, to the transfer of the calves to the second shed at 10 weeks, where lying became more difficult. The field calves did not show any significant trend in this activity at ages of up to 16 weeks.

Standing. Standing, however, showed a significant increase with age in the confined calves. The increase from 1.5
to 9.45 minutes/hour occurred when the calves were transferred to the novel situation in the second shed. No significant change was shown in the amount of standing performed by the field calves over this age range.

Eating. The confined calves did not show any significant increase in eating with age, as is normal in field calves. This finding was presumably related to their not having sufficient hay or straw to eat.

Ruminating. As the rumen develops in the young field calf, there is an increase in the time spent ruminating with age. For the confined calves, however, this was not the case; more ruminating occurred in the confined calves between the second and sixth weeks. Then, after transfer to the more confined second shed, the ruminating decreased.

Sleeping. This behavior decreased with age of the calf and transfer to the

### TABLE 3 Differences Between Field Calves* and Confined Calves in the Ontogeny of Several Behaviors

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<tr>
<th>Activity</th>
<th>Field Calves</th>
<th>Confined Calves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lie</td>
<td>No change</td>
<td>Decrease (P &lt; 0.001)</td>
</tr>
<tr>
<td>Stand</td>
<td>No change</td>
<td>Increase (P &lt; 0.01)</td>
</tr>
<tr>
<td>Eat</td>
<td>Increase (P &lt; 0.01)</td>
<td>No change</td>
</tr>
<tr>
<td>Ruminate</td>
<td>Increase (P &lt; 0.01)</td>
<td>No change</td>
</tr>
<tr>
<td>Move</td>
<td>No change</td>
<td>Decrease (P &lt; 0.01)</td>
</tr>
<tr>
<td>Self-groom</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Chew object</td>
<td>No change</td>
<td>Increase (P &lt; 0.05)</td>
</tr>
<tr>
<td>Sleep</td>
<td>No change</td>
<td>Decrease (P &lt; 0.01)</td>
</tr>
<tr>
<td>Call</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Social contact</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Play</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Head-shake, head-toss, kick, and scratch</td>
<td>No change</td>
<td>Increase (P &lt; 0.01)</td>
</tr>
<tr>
<td>Urinate</td>
<td>No change</td>
<td>Increase (P &lt; 0.05)</td>
</tr>
</tbody>
</table>

1Analyzed by the Kolmogorov-Smirnov two-sample test.

### FIGURE 1
Circadian rhythm in the performance of different activities by confined calves: lie, stand, cud, eat, and move. The feed times are marked on the hour axis with a dark line; the time of dawn and dusk is shown below the axis.

### FIGURE 2
Circadian rhythm in the performance of different activities by confined calves: lick, chew, sniff, and call. The feed times are marked on the hour axis with a dark line; the time of dawn and dusk is shown below the axis.

Moving. This behavior showed a significant decrease with age in the confined calves, which was, again, related to their increasing restriction. There was no significant change among similar field calves in this age range.

Self-grooming. This activity increased significantly in the field calves with age. Among the confined calves, it showed a dramatic peak at 8 weeks and then (perhaps because grooming became physically difficult because of tethering) diminished after transfer to the second shed.

Chewing. This activity increased with age. Throughout the period, it occurred much more frequently than in the field calves, where it showed no change with age.

Sleeping. This behavior decreased with age of the calf and transfer to the second shed.

Calling. This behavior showed no significant trend with age in either group. When the calves were initially confined in the veal unit, they called almost continuously for approximately 12 hours. Similarly, when they were transferred to the second shed, there was an increase in calling, for the first 3 hours.

Social contact, sniffing, and playing. There was no significant trend with age in these activities.

Head-shaking, head tossing, kicking, and scratching. There was a marked increase in these activities when the animals were moved to the second shed.
Moving. This behavior showed a significant decrease with age in the confined calves, which was, again, related to their increasing restriction. There was no significant change among similar field calves in this age range.

Eating. The confined calves did not show any significant increase in eating with age, as is normal in field calves. This finding was presumably related to their not having sufficient hay or straw to eat.

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</tr>
<tr>
<td>Stand</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Eat</td>
<td>Increase (P &lt; 0.01)</td>
<td>No change</td>
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<tr>
<td>Ruminate</td>
<td>Increase (P &lt; 0.01)</td>
<td>No change</td>
</tr>
<tr>
<td>Move</td>
<td>No change</td>
<td>Decrease (P &lt; 0.01)</td>
</tr>
<tr>
<td>Self-groom</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Chew object</td>
<td>No change</td>
<td>Increase (P &lt; 0.05)</td>
</tr>
<tr>
<td>Sleep</td>
<td>No change</td>
<td>Decrease (P &lt; 0.01)</td>
</tr>
<tr>
<td>Call</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Social contact</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Play</td>
<td>No change</td>
<td>No change</td>
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Moving. This behavior showed a significant decrease with age in the novel situation in the second shed. No significant change was shown in the amount of standing performed by the field calves over this age range.

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Head-shaking, head tossing, kicking, and scratching. There was a marked increase in these activities when the animals were moved to the second shed.

FIGURE 1 Circadian rhythm in the performance of different activities by confined calves: lie, stand, cud, eat, and move. The feed times are marked on the hour axis with a dark line; the time of dawn and dusk is shown below the axis.

FIGURE 2 Circadian rhythm in the performance of different activities by confined calves: lick, chew, sniff, and call. The feed times are marked on the hour axis with a dark line; the time of dawn and dusk is shown below the axis.
Differences Between the Sheds

Table 3 shows that the transfer, at 10 weeks, to the second shed had an effect on almost every behavior. Standing and eating increased, whereas sleeping, moving, ruminating, calling, and lying decreased. The calves appeared to be performing more of those activities that they were still able to perform when yoked.

Other Behavior

Sexual behavior. On 15 occasions, calves were observed to have erections. On four occasions, there was thrusting and back-arching. On two occasions, the calves attempted to lick their erected penis. One calf gave bull-like roars at 14 weeks of age, and there were three occurrences of head-rubbing and posturing, typical bull behavior (Schloeth, 1958). In the field, only mounting, mutual genital smelling, and circling were recorded at these ages (Kiley-Worthington and de la Plain, 1983).

Injuries, falls, and walking difficulties. Severe falls in the pens were recorded on eight occasions during the observation period (1 fall every 3 hours/100 calves). These occurred among the yoked animals, usually while they were attempting to lick their backs and rear ends.

During the study, 6.7 percent of the 40 calves in the second shed developed swollen and stiff joints, and all the calves in the second shed developed stiff joints, and all the calves in the second shed developed stiff joints, and all the

FIGURE 3 "Personality profiles" of five calves (to be read vertically). This shows the difference between the calves in the amount of time calves spent performing the various activities. The vertical axis indicates the number of minutes the activity was observed during each hour. The * sign indicates that the value is significantly different from the mean (P < .05).

FIGURE 4. The ontogeny of different behaviors in the confined calves. Graphs of values for field calves are also provided for comparison (from Kiley-Worthington and de la Plain, 1983). The vertical axis indicates the number of minutes the activity was observed per hour; the horizontal axis shows the age of the calves (12 confined calves; 8 field calves). The bar that begins at the 10-week mark indicates the time spent in the second shed.
Differences Between the Sheds

Table 3 shows that the transfer, at 10 weeks, to the second shed had an effect on almost every behavior. Standing and eating increased, whereas sleeping, moving, ruminating, calling, and lying decreased. The calves appeared to be performing more of those activities that they were still able to perform when yoked.

Other Behavior

Sexual behavior. On 15 occasions, calves were observed to have erections. On four occasions, there was thrusting and back-arching. On two occasions, the calves attempted to lick their erected penis. One calf gave bull-like roars at 14 weeks of age, and there were three occurrences of head-rubbing and posturing, typical bull behavior (Schloeth, 1958). In the field, only mounting, mutual genital smelling, and circling were recorded at these ages (Kiley-Worthington and de la Plain, 1983).

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calves had difficulty standing up in the second shed.

When let out to the pens to be loaded into trucks to go to slaughter, the confined calves moved in an uncoordinated way, which resembled the walking and leaping of calves newly born (Kiley-Worthington and de la Plain, 1983).

Discussion and Conclusion

One of the aims of this study was to discover what confined calves—which were provided with all the necessities for sustaining life, and physically prevented by restriction from performing more activities (e.g., running around, investigating the environment, sucking, and social activities such as mutual grooming, smeling, and rubbing and fighting)—would do with their "extra" or "spare" time.

Before we can answer this question, it is necessary first to look at how the mother-reared, free-range calf distributes its time. Data on this question come from several recent studies (e.g., Kiley-Worthington and de la Plain, 1983). A comparison with these findings is interesting. For example, it seems that rather less time was spent by the field calves in lying down than by the confined animals. What is particularly interesting, however, is that despite the restricted amount of fiber in the diet of the confined calves, they spent rather more time ruminating (7.8 minutes/hour; field calves, 4.5 minutes/hour). It is possible that these confined calves may have been "pseudo-ruminating" (Gordon, 1958). This behavior could thus serve to use up "spare" time by increasing self-stimulation (Kiley-Worthington, 1977, p. 74). The confined calves also spent some time in self-grooming (1.2 minutes/hour). Hairballing in the rumen as a consequence of this activity had previously become a problem in this unit. The proprietor had therefore decided to feed small amounts of straw to try and reduce it.

The confined calves also spent a considerable amount of time chewing objects, usually the sides of the pen (5.1 minutes/hour), an activity that hardly ever occurs in the field. This is a well-documented phenomenon among confined and restricted animals, and frequently develops into a stereotypy termed "cribbing" (e.g., Kiley-Worthington, 1977). Intersucking among calves can also become one of these stereotypes, but in these animals it was almost entirely prevented by individual housing. The amount of time spent standing and eating was lower than for the field calves. The increased standing observed among the field calves may be related to the amount of time they spend standing and looking around them, an activity likely to be reduced where there is a very restricted visual field. Confined calves spent little time investigating the environment (1.75 minutes/hour; field calves, 3.5 minutes/hour), probably for the same reason.

Finally, the confined calves performed activities such as head-tossing, head-shaking, leaping around, rubbing, and scratching more frequently than did the field calves. These activities are often associated with frustration (e.g., Duncan and Wood-Gush, 1974; Konarski, 1967, Bergson, 1967; Berlyne, 1960).

Individual Differences in Behavior

This analysis shows that individuals have different strategies for adapting to a restricted environment. Thus, some calves spend most of the time lying down and sleeping, while others spend more time scratching themselves, or doing more of those activities that they are still able to do within the confines of their situation. The amount of individual variation is considerable; it is therefore more appropriate to construct individual personality profiles than to make generalizations about their behavior.

Certain calves (such as no. 17) adapt to the confined environment by lying and sleeping more, and when awake are very social. Others (no. 19) show evidence of possible stereotyped behavior, which is often characteristic of frustration and attempts at self-stimulation (e.g., kicking, scratching, rubbing, chewing). One could argue that this animal is less well adapted to the conditions than calf 17, and that perhaps the latter group should therefore be selected for breeding programs. However, we have no indication at present as to what extent such individual adaptive strategies might be inherited.

Ontogeny of Behavior

Various changes in behavior with age are to be expected in calves. However, much of the ontogeny of behavior of the confined calves in this study did not parallel that of the field calves.

TABLE 4 Differences in Behavior Between Sheds

<table>
<thead>
<tr>
<th>Activity</th>
<th>Nursery shed (2-10 weeks old)</th>
<th>Second shed (16-16 weeks old)</th>
<th>Significant at P &lt; .01 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand</td>
<td>21</td>
<td>26.16</td>
<td>Yes</td>
</tr>
<tr>
<td>Lie</td>
<td>39.96</td>
<td>32.08</td>
<td>Yes</td>
</tr>
<tr>
<td>Eat</td>
<td>2.96</td>
<td>3.68</td>
<td>Yes</td>
</tr>
<tr>
<td>Move</td>
<td>1.16</td>
<td>0.72</td>
<td>Yes</td>
</tr>
<tr>
<td>Sleep</td>
<td>0.88</td>
<td>0.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Ruminant</td>
<td>6.92</td>
<td>5.64</td>
<td>Yes</td>
</tr>
<tr>
<td>Suck</td>
<td>0.6</td>
<td>0.88</td>
<td>Yes</td>
</tr>
<tr>
<td>Lick</td>
<td>7.4</td>
<td>5.92</td>
<td>Yes</td>
</tr>
<tr>
<td>Chew</td>
<td>1.6</td>
<td>1.24</td>
<td>Yes</td>
</tr>
<tr>
<td>Sniff</td>
<td>1.56</td>
<td>1.08</td>
<td>Yes</td>
</tr>
<tr>
<td>Itch</td>
<td>3.16</td>
<td>1.36</td>
<td>Yes</td>
</tr>
<tr>
<td>Social contact</td>
<td>0.32</td>
<td>0.28</td>
<td>No</td>
</tr>
<tr>
<td>Urinate</td>
<td>6.2</td>
<td>3.4</td>
<td>Yes</td>
</tr>
<tr>
<td>Leap (times/hour)</td>
<td>13.3</td>
<td>11.28</td>
<td>No</td>
</tr>
<tr>
<td>Call (times/hour)</td>
<td>0.48</td>
<td>0.08</td>
<td>Yes</td>
</tr>
</tbody>
</table>

These differences were emphasized in the second, more confined shed. For example, standing was seen to increase significantly with age. Also, activities often associated with frustration, such as chewing, rubbing, scratching, head-tossing, and head-shaking, increase with age among confined calves; this is not true in the field calves.

Some or all of these differences in behavioral ontogeny may be related to the change to the more restricted second shed. A comparison shows that almost every behavior demonstrates a significant change between the two sheds.

Circadian Rhythms

Among the field calves, day length, the weather, and age of the calf can affect activity rhythms to the point where
M. Kiley-Worthington—Confined Calves

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Animal Welfare and the Confined Calf: Toward Measurements of “Distress”

The limits of acceptability of intensive animal husbandry today depend to a great extent on the demonstration of animal suffering or “distress” in particular units. As Ekesbo (1978) and many others have pointed out, although the animals are productive and apparently in good physical health in many of the intensive units, this does not necessarily indicate that they are not suffering or distressed. Thus, in addition to physical criteria, ethological criteria that assess the animals’ psychological welfare must be considered. Some steps have recently been taken along this line (e.g., Wood-Gush, 1973; Duncan and Wood-Gush, 1974; Kiley-Worthington, 1977). However, the debate remains confused, as Dawkins (1980) points out.

It is suggested here that a comparison of behavior between a field population and a confined population furnishes some direction to practical approaches toward assessing animal suffering or “distress” in a farm situation. The criteria that might be used to assess the potential acceptability of a particular type of unit might be itemized as follows: Although, of course, further research is necessary before any definitive guidelines can be suggested.

1. The numbers and types of activities that normally occur in species and age group, but which are prevented from being performed as a result of confinement or isolation (e.g., in this study, in the first unit—mutual playing, forward movement, investigation of a changing environment, sucking; in the second shed—inability to turn around, to groom all parts of the body, to stand up and lie down with facility, easy social interaction).

This argument was first made by Brambell (1963), when he suggested that animals have “behavioral needs.” This assertion remains controversial (see, e.g., Dawkins, 1980), but perhaps it should be further discussed from a functional point of view.

All normal species-specific behavior is, in the long term, adaptive (Darwin, 1871; Wilson, 1975). It can thus be argued that the elimination of behaviors from the behavioral repertoire, or large-scale changes in the amount of time allotted to these behaviors or their distribution, may be maladaptive and, because of this, distressing. “Distress,” and its physiological equivalent, “stress,” are of course also adaptive; their function is to motivate the animal to make physiological or behavioral changes and thus to return it to an adaptive equilibrium (Selye, 1950).

It has been argued that, by selective breeding, we have created domestic animals that are genetically very different from their wild ancestors, and that they therefore no longer have similar “behavioral needs” (Beilharz and Zeeb, 1981). Good evidence for this is not available at present. Certainly there are some differences in behavior between wild and domestic species, and we have indeed selected for wide variations in certain types of behavior. One example is the differences we see in the behavior of a sheep dog as compared with a retriever. These authors, however, confuse the issue by suggesting that such genetic changes can be directly related to all behaviors. The point is that both these breeds behave differently, to the extent that the sheep dog tends to use vision more than the retriever in performing its duties. However, both breeds have a well-developed olfactory system, and a large part of their brains is devoted to analysis of the information that is input through this system. There is no physiological evidence that this capacity has declined in the sheep dog. And until we breed a dog without an olfactory system, we cannot conclude that dogs have no “behavioral need” to exercise this system.

Thus, to keep a dog in an environment lacking in olfactory stimuli, where he cannot exercise these facilities may, for this functional reason, be considered “distressing.”

The extent to which domestication has changed underlying behaviors that have evolved over millions of years, as a requirement for survival, is very small, as far as the currently available evidence goes. The social organization, feeding habits, and sexual behavior of chickens, dogs, pigs, and cattle, when given an opportunity to be performed (in their respective groups, for example) remains very similar to that of their extant wild ancestors or close relatives (for a summary of the evidence, see Kiley-Worthington, 1977).

Thus, although in theory we may (given enough time) be able to breed a chicken or calf that cannot and “need” not walk, groom itself, and so on, at present the natural set of both social and maintenance activities are behavioral needs, although these can be modified by the animal’s life experiences and its environment.

Therefore, on the basis of the present study, an ability to scratch or lick all parts of the body must be construed as a behavioral need. We know that this activity is necessary to maintain skin health, and we also know that unconfined calves are able to do this (Kiley-Worthington and de la Plain, 1983). Confined in a situation where this is not possible causes irritation, reduces skin health, and is maladaptive (hence, distressing). Similarly, unconfined calves move around, and are able to get up and lie down at will with facility. Restriction so that none of these activities is possible with ease may be considered maladaptive and therefore distressing. This is shown to be the case by the observation that the animals were unable to walk and balance in a way appropriate to their age at the end of their period of confinement. Mild hip damage and stiffness as a result of difficulties in standing and lying down was found in 4 percent of the calves from one shed.

Thus, to prevent such activities from being performed is to create a maladaptive and therefore distressing situation. It may be that such restrictions also give rise to physiological stress, but to date this has not been measured.

2. The performance of behavioral pathologies, or abnormalities. These include activities such as excessive self-licking (which has previously resulted in hair-balling in this unit) and stereotypes such as cribbing, chewing, weaving, and pacing. (The latter two were not found in these calves.)

3. Great differences in the distribution of time allotted to the activities that can still be performed within the confined environment. For example, there was a great increase in self-stimulative, nonstereotypic movements such as chewing or rubbing. There was also an increase in standing in the second shed, and the increase in rumination noted among the confined calves is particularly interesting in this regard.

4. An increase in activities often associated with frustration or conflict such as head-tossing, head-shaking, kicking, tail wagging, and scratching.

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How do the two sheds used on this study score on these various criteria, and could the calves within them be considered distressed and therefore suffering?

Although the calves in the first shed were isolated from nearly all contact with their peers and from their mother, were restricted, and were fed a diet that was principally liquid (although furnished with small amounts of straw), they nevertheless showed remarkably few behavioral changes or pathologies. They, however, did show a marked increase in self-grooming (criterion 2), early development of rumination (criterion 3), and an increase in activities that can be related to frustration (criterion 4). Thus, three of the seven criteria were fulfilled. It can be suggested, therefore, that according to these criteria, calves kept under this sort of system in this kind of unit were not distressed to a great degree, and therefore that such husbandry might be acceptable, from the welfare point of view.

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Selecting a Spay/Neuter Program for Animal Control in the City of Charlotte

Diane Quisenberry and Mary Elizabeth Clapp

Diane Quisenberry is Superintendent of Animal Control and Mary Elizabeth Clapp is a Systems Analyst for the Operations Department, City of Charlotte, 2700 Tooney Avenue, Charlotte, NC 28203.

The City of Charlotte, NC, in attempting to determine the best kind of program for reducing its increasing populations of unwanted dogs and cats, examined a full range of possible options for limiting these populations. Five measures for population control were considered: spay/neuter surgery, euthanasia, physical restraint, mechanical contraception, and chemical contraception. It was concluded that a spay/neuter program that incorporated educational and legislative components would be the most effective means of large-scale population control, although other methods like euthanasia would still have to be used. Based on a survey of a number of cities with spay/neuter programs in place, it was found that a municipally run clinic for such surgery, with no excluding criteria related to income of clients, offered the best hope for limiting the future numbers of stray and unwanted animals.

Zusammenfassung


Introduction

Animal control has only recently been accepted as a job or function for which a municipality would be responsible. The major purpose of animal control is the reduction of growth of the animal population: dogs and cats are highly prolific. Both reach sexual maturity very quickly, usually at 6 to 8 months of age. Their gestation period is extremely short (58 to 65 days) and their offspring are born in large numbers (litters of 3 to 10). These factors mean that a dog is nearly 15 times as prolific as a human, and a cat 30 to 45 times as prolific. Even under-controlled conditions, for example, a single female dog and her progeny can be responsible for increasing the animal population by over 4,400 within 7 years. At the current cost of $26 for every animal handled by the City Animal Shelter, the impact of these factors on the future cost of animal control activities in the City of Charlotte could be economically overwhelming. Therefore, city officials were compelled to develop a comprehensive and cost-effective program for dealing with surplus animal populations.

Available Options for Control

Five measures are currently available for controlling the animal population: (1) spay/neuter surgery; (2) euthanasia; (3) physical restraint; (4) mechanical contraceptives; and (5) chemical contraceptives. Each of these options has its distinctive attractions and weaknesses, as detailed below.

1. Spay/Neuter Surgery

Probably the most feasible and effective solution to the animal overpopulation problem is a program that includes public education and legislation that encourages the pet owner to control the animal or have it surgically altered, and low-cost spay/neuter sterilization. In most cases, the purpose of education and legislation is to increase the number of sterilizations performed. Most pet owners who choose to have their pet spayed or neutered base their decision on the following benefits of sterilizations discussed in a brochure distributed by the Veterinary Medical Association of Tennessee.

The most effective and permanent method of preventing pregnancy is surgical sterilization (neutering). In female dogs and cats, the uterus and ovaries are removed (spaying). In males, the testicles are removed (castration). Sterilization effectively eliminates the capability to reproduce and thus prevents overpopulation, but it also produces a variety of other benefits to pet and owner alike.

Castration in the cat produces some profound changes in habits and attitude. Early castration reduces roaming, howling and fighting, so common in the uncastrated male. The habit of male cats of marking their territory with urine by spraying house and furnishings is eliminated by early castration. Even in male cats where these vices are firmly established, castration has been shown to reduce fighting and urine spraying by 53% and 78%, respectively. Elimination of fighting greatly reduces the occurrence of abscesses, a common disease of tomcats. The neutered male cat becomes a better, healthier pet.

Neutering the female cat eliminates the frequently recurring estrous cycles with the associated howling and desire to roam. It eliminates the owner’s responsibility for finding homes for two litters of kittens a year. Common disease problems such as infections of the uterus (pyometra) are eliminated, and the risk of mammary cancer is reduced to 1/7 that in unspayed cats. As with the male cat, neutering improves the health of the cat as well as eliminating some of the inconveniences to the owner.

Castration in the dog appears to reduce the tendency to roam, though this is not as clear-cut as is the case in the cat. The roaming of young male dogs appears to account for their being hit by cars twice as often as are females. Castration eliminates the hazard of testicular tumors and...
Selecting a Spay/Neuter Program for Animal Control in the City of Charlotte

Diane Quisenberry and Mary Elizabeth Clapp

The City of Charlotte, NC, in attempting to determine the best kind of program for reducing its increasing populations of unwanted dogs and cats, examined a full range of possible options for limiting these populations. Five measures for population control were considered: spay/neuter surgery, euthanasia, physical restraint, mechanical contraception, and chemical contraception. It was concluded that a spay/neuter program that incorporated educational and legislative components would be the most effective means of large-scale population control, although other methods like euthanasia would still have to be used. Based on a survey of a number of cities with spay/neuter programs in place, it was found that a municipally run clinic for such surgery, with no excluding criteria related to income of clients, offered the best hope for limiting the future numbers of stray and unwanted animals.

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Although these changes in habits and lifespan are desirable objectives to the pet owner, education and legislation are also necessary to convince the pet owner that the most important objective of sterilization is the reduction in the overpopulation problem. The dog population has increased 38 percent in the last decade (based on an estimate of one dog for every six persons and a 38 percent increase in the human population). This estimate is supported by the fact that the number of dogs processed by the City Shelter has increased almost 30 percent. The important figure for animal control purposes is the number of dogs capable of breeding, and projections indicate that this figure could be over 40,000 by 1990.

A program involving spaying/neutering surgery could have an impact on the projected population in two areas. First, public education and low-cost surgery would reduce the number of "owned dogs" capable of breeding. Second, legislation that required sterilization of dogs adopted from the shelter would reduce the number of "Adopted/Reclaimed from Shelter" dogs that are capable of breeding.

However, neither education nor legislation is sufficiently effective to persuade the pet owner to spay or neuter his or her animals unless the cost of sterilization is relatively low. The average costs of the operation in Charlotte (as of October 1980) were $62 and $52 for female and male dogs, respectively. Thus, a $10 to $15 discount on the license fee for neutered animals will take 4 to 6 years to recover. By itself, this is probably not a sufficient incentive to encourage owners to opt for sterilization of their animals.

2. Euthanasia

Euthanasia is necessary because animal shelters seldom have an alternative due to the cost and space constraints under which they operate. Animal shelters must also euthanize to avoid contributing to the overpopulation problem. Although it would appear to be more humane to keep the animal until it is adopted, the adoption of fertile animals from shelters merely contributes to the overpopulation problem, since the animals are thereby given the opportunity of producing offspring, the majority of which will end up at a shelter.

Euthanasia is currently the only tool used in response to the overpopulation problem in the City of Charlotte. The emphasis in any euthanasia program is on ensuring that the most humane procedures are used and that those performing the task are capable and compassionate. Two years ago the City of Charlotte's Animal Shelter switched from an engine that produced carbon monoxide (CO) for the euthanizing chamber to bottled CO.

In addition, the Animal Shelter began to use T-61 solution in 1978 to euthanize sick and injured animals and puppies and kittens. These two recommended methods ensure that euthanasia will be quick and painless for the animals, but they do cost more than the old method. In fiscal year 1979-1980, it costs $41 per animal to euthanize by these modern techniques. The cost in the first 2 months of the 1980-1981 fiscal year has increased to over $45 per animal. The percentage of the total City of Charlotte budget that is expended on Animal Control activities has increased from 0.3 percent in 1970 to 0.6 percent in 1980.

Although the cost of control is very high, the City of Charlotte is at least attempting to "control" stray animals, as required by the animal control ordinance. Little has been done, however, to reduce the problem. None of the established programs, or projects, has been able to reduce the problem of stray, un inoculated animals. Since 1969, when the City of Charlotte began to keep records on the number of dogs processed through the City Shelter, the number of dogs picked up has increased 30 percent. The number of dogs sold or reclaimed has decreased 31 percent due to closer scrutiny of adoption applicants. As shown in Table 1, the result of more dogs being picked up while fewer are sold or reclaimed is an increased need for euthanasia.

The most impressive change is the 285 percent increase in the cost of performing animal control tasks. Much of this has occurred in the past 4 years due to increases in the level of service to citizens and to improvements in conditions, food, medical care and euthanasia methods for animals processed through the Animal Shelter. Of greater impact on the question of spaying/neutering, however, is the relationship of the number of dogs processed to the number euthanized. Even though there has been a 75 percent increase in the number of dogs euthanized, there has been no reduction in the number of stray dogs picked up or the number donated. This is even more significant when combined with the reduction of dogs returned to the community (i.e., fewer are adopted). Even though fewer dogs are being adopted and more dogs are being euthanized — thus reducing in two ways the number in the animal population — the number of dogs picked up increases. At the current rate of increase, the population of dogs processed by the shelter in 1992 will be approximately 16,000.

Animals are also being removed from the population as a result of death from disease, accidents, and old age. An increasingly large number are being removed as a result of automobile accidents and cruelty. As shown in Table 2, the numbers of dead animals removed from city streets by the Sanitation Division has increased 30 percent in the past 4 years.

All this reflects not only a continued rise in the animal population but also a continued increase in the cost of handling each dog. This escalation in the cost per dog is due to the decrease in revenue obtained from the sale of adopted dogs, as well as the increase in operating costs.

Euthanasia provides only an arithmetic solution to the problem of animal overpopulation: each animal euthanized reduces the population by only one animal. Euthanasia would only be effective if animals reproduced at the rate of one for one, i.e., if each female dog produced only one puppy to replace her in the animal community. In reality, however, a dog or cat reproduces at a geometric rate. Even under conditions where breeding constraints are involved, a female dog and her progeny can be responsible for increasing the animal population by 72 in 7 years.

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Mechanical contraceptives, such as intrauterine devices and chemical implants in the skin, have not been sufficiently researched and tested to ensure the safety of the animal and acceptability to the animal owner. In addition, the cost is nearly as high as surgical sterilization and results are not nearly as reliable.

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Loss of Manpower for Ordinance Enforcement Tasks

There is another cost factor involved in animal control that is more difficult to quantify: The control of stray, unwanted dogs involves manpower that could be occupied in enforcing other aspects of the ordinance. Increased enforcement of license requirements, for example, would result in an immediate increase in revenue and, in the long run, would increase the number of animals licensed from 52 percent to about 80 percent. Currently, almost 45 percent of the field officer's time is directly involved in the control of stray, unwanted dogs. Less than 5 percent is devoted to enforcing the inoculation and licensing requirements. If more time were available, the officers would not have to canvass for offenders, but could use the recently implemented computer system to identify offenders directly. The current automated Animal Control System provides reports on persons who have declared ownership of a dog for tax purposes but do not have a valid dog license. The amount of revenue that would have been derived using the 1980 report to identify offenders would have exceeded $100,000, based on the current $10 fine for not having a license. This stricter enforcement would minimize the number of offenders and increase the percentage of the dog population that is inoculated and licensed.

The cost of controlling the animal population can, therefore, be viewed in two ways. First, there is the direct cost of processing animals through the Animal Shelter. The cost per dog is higher for euthanized dogs than for adopted dogs. As more dogs are processed, however, the demand for euthanasia increases. The increased use of euthanasia to control the problem has not resulted in a decrease in the dog population. It is, therefore, a spiraling problem that could reach unmanageable proportions. Second, there is the indirect cost of the loss of opportunity to enforce the ordinance.

<table>
<thead>
<tr>
<th>Year</th>
<th>Budget</th>
<th>Picked Up</th>
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% Change from 1970-1980: +285% +30% -31% +75%

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TABLE 1 Dogs Processed by City Shelter, 1970-1981

TABLE 2 Number of Animals Killed by Automobiles Since 1977
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<td>9,732</td>
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TABLE 3 Surveyed Cities with Effective Ratios

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<th>Location</th>
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and thus better achieve the overall goal of the animal control program. Making good use of this opportunity would also result in a temporary increase in the amount of revenue generated by the Animal Shelter.

Evaluation of Spay/Neuter Clinics and Programs

To obtain sufficient data on spay/neuter services for evaluating the best type for the City of Charlotte, the Operations Department developed a questionnaire and forwarded it to 89 randomly chosen municipalities and humane societies. Although 49 of the questionnaires were filled out and returned, only 30 contained enough information to be included in the evaluation process. The response was sufficient, however, for general comparative purposes and for determining the most effective types of spay/neuter services. Insufficient information, therefore, prevented determination of the degree of impact of such individual factors as differential licensing upon spay/neuter services.

The four types of spay/neuter services reported in the survey can be grouped into two basic categories:

- Clinic: A facility operated by one agency—usually a humane society or a municipality—for the sole purpose of performing spay/neuter surgery. No other veterinary services are provided.

- Program: Any other type of cooperative arrangement involving more than one agency. Most of the cooperative programs involve either (1) a municipally funded program in conjunction with local veterinarians or (2) a humane society-funded program in conjunction with local veterinarians.

In the following sections, a general description is provided on the four basic types reported on the survey.

1. Spay/Neuter Program Involving Municipality and Veterinarians

The following five respondents to the survey have established spay/neuter programs operated by the municipality in conjunction with local veterinarians.

- Baton Rouge, Louisiana
- Milwaukee, Wisconsin
- Kansas City, Missouri
- Honolulu, Hawaii
- Reading, Pennsylvania
- Santa Cruz County, California

Three of the programs involve the sale of certificates, which are used at local veterinary clinics for payment. The certificate cost less than the fees normally charged by the veterinarians. Two programs involve low-cost spay/neuter for persons qualifying on the basis of income. Three programs involve mandatory spay/neuter for animals adopted from the shelter. Program contains an additional incentive for the animal owner, whereby impoundment charges are waived if the owner has the animal altered within a specified time.

Honolulu, Hawaii, has the most successful program, based on the number of animals altered per citizen. The municipality pays 12 percent of the total cost of the program. Surgical fees for the surgery are shared by the veterinarian (33 percent), owner (33 percent), humane society (16 percent), and the municipality (17 percent). The program is supposedly based on the financial need of the owner as determined by the humane society. The veterinarians are dissatisfied, according to the survey response, because the criteria for financial need is not sufficiently stringent. The municipality is currently considering “following the methods which have been put into operation by the British Columbia SPCA; specifically, differential licensing for dogs, construction of a spay/neuter clinic, tattooing of all dogs, and involving a city/county ordinance which would require the identification of all cats.”

3. Spay/Neuter Clinic Operated by Humane Society

Eleven of the operations reported in the survey consisted of spay/neuter clinics operated by a humane society.

- Calverton, New York
- Burke County, Pennsylvania
- Salt Lake City, Utah
- Annapolis, Maryland
- Anchorage, Alaska
- New Orleans, Louisiana
- Birmingham, Alabama
- Marlton, New Jersey
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1. **Spay/Neuter Program Involving Municipality and Veterinarians**

The following five respondents to the survey have established spay/neuter programs operated by the municipality in conjunction with local veterinarians.

- Long Beach, California
- Baltimore, Maryland
- Denver, Colorado
- Wichita, Kansas
- Alamance County, North Carolina

Four of the programs provide spay/neuter surgery only for animals adopted from the shelter. The new owner pays less for the spay/neuter than would be paid if the animal were obtained from a pet shop, breeder, or other source. The response from Denver, Colorado, indicates that its program is not effective because only welfare recipients qualify. Only one dog may be accepted per family although, in many cases, the family owns more than one dog.

Programs in this category provide the least amount of information. Usually more than one veterinarian was involved in the program, and none maintained records on the surgeries performed as a result of the program. None of the six programs involved any operational costs, since the spay/neuter surgery was performed at a veterinarian's clinic. Based on the comments provided by the respondents, none of the programs incorporated an adequate degree of public education, which may account, in some degree, for the lack of success of these programs.

The program in Long Beach, California, involves differential licensing as an inducement to pet owners to have their animals altered.

2. **Spay/Neuter Programs Involving Humane Societies and Local Veterinarians**

Six survey respondents reported the establishments of spay/neuter programs operated by a humane society in conjunction with local veterinarians.

- Baton Rouge, Louisiana
- Milwaukee, Wisconsin
- Kansas City, Missouri
- Honolulu, Hawaii
- Reading, Pennsylvania
- Santa Cruz County, California

Three of the programs involve the sale of certificates, which are used at local veterinary clinics for payment. The certificate cost less than the fees normally charged by the veterinarians. Two programs involve low-cost spay/neuter for persons qualifying on the basis of income. Three programs involve mandatory spay/neuter for animals adopted from the shelter. One program contains an additional incentive for the animal owner, whereby impoundment charges are waived if the owner has the animal altered within a specified time.

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Eleven of the operations reported in the survey consisted of spay/neuter clinic(s) operated by a humane society.

- Calverton, New York
- Burke County, Pennsylvania
- Salt Lake City, Utah
- Annapolis, Maryland
- Anchorage, Alaska
- New Orleans, Louisiana
- Birmingham, Alabama
- Marlboro, New Jersey
Many of the respondents provided information on the number of spay/neuter surgeries performed per year. This information was used to calculate the ratio of the number of animals altered to the human population. Many of the clinics have a small ratio (i.e., are performing a large number of spay/neuter surgeries each year in relation to the human population). Some of these have been in operation long enough to have had a significant impact on the animal population and animal control activities. Yet, none of these respondents provided any information on this issue.

Some of the clinics reported problems due to lack of response and apathy from pet owners. The clinic in New York reported a 33 percent no-show rate. This could be another indication of the importance of an adequate, comprehensive public education program. Some of the clinics provided free surgery for animals adopted from the shelter and low-cost surgery for residents with limited incomes. All but three of the clinics were self-supporting. Two of these three fail to cover their operational costs because spay/neuter surgery is provided free to pet owners who adopt animals from the shelter operated by the humane society. The other clinic fails to meet its operational costs because it does not collect in advance and, therefore, never receives many payments.

The clinics reporting the best rate of animals altered to population are in localities with 100,001 and 250,000 individuals in the population. They also report good public response to the clinic as a result of their public education program.

4. Spay/Neuter Clinic Operated by Municipality

The municipalities that operate a spay/neuter clinic provided the most information on their operations:

- Pinellas County, Florida
- Palo Alto, California
- Santa Clara County, California
- Grand Rapids, Michigan
- Las Vegas, Nevada
- San Mateo, California
- Los Angeles, California

These are also the most successful in terms of ratio of animals altered per citizen and impact on animal population. All clinics that kept data on their operational costs were self-supporting. It should also be noted that they charged the lowest fees and had lower operating costs per animal than the clinics operated by humane societies. None of the clinics was restricted to owners with low incomes; all residents could have one or more animals altered.

Two of the respondents, Santa Clara County and Los Angeles used differential licensing to encourage pet owners to have their animals altered. Residents of Santa Clara County pay 50 percent less for a license for a spayed or neutered dog. None of the respondents reported any problems with their clinics.

Comparison of Programs and Clinics

There are certain variables that affect the impact of a spay/neuter program or clinic.

1. Differential Licensing

   Economic pressures are usually the most significant determining factor for a successful spay/neuter operation. Many cities provide an incentive to pet owners in the form of differential licensing. Owners with spayed or neutered animals are charged a small license fee, while their counterparts with unspayed or unneutered animals must pay a larger fee. The difference varies from $10 to $20 in the cities that have adopted such a policy. Proof of the surgery is required by the owner, who usually obtains it from the attending veterinarian.

   The prospect of accumulative savings sometimes induces people to have their pets sterilized. Most cities, however, have combined the differential licensing plan with a low-cost spay/neuter service. By incorporating a differential licensing plan in the spay/neuter concept, a fair, low-cost alternative is offered. To be effective, the differential license savings must be significant. A $5 savings is of limited motivational value; however, a $20 annual savings to owners of spayed or neutered animals may also represent an unfair cost to owners of unspayed/unneutered animals, unless low-cost spay/neuter surgery is available.

2. Mandatory Spay/Neuter

   Each time an unaltered animal is sold by the City Shelter and returned to the animal community, the organization that is responsible for animal control is contributing to the overpopulation problem and thereby increasing its own workload and dilemma. The animals that are being euthanized today could be the offspring of a female dog sold by the City Shelter years ago. Each year, the City Shelter picks up or receives approximately 20 percent of the estimated dog population. It is estimated that 11,700 to 12,740 dogs will be handled in this fiscal year. At the current rate of expenditures it will cost $25 to $28 to handle each animal this year and $75 to $80 each by 1990. Using the conservative estimate that 72 animals will return to the shelter during the next 10 years as a result of the adoption of one female dog, the City of Charlotte could ultimately spend over $4,000 on animal control activities in return for the $10 gained from the sale of that female dog.

   The only method that can stop this additional exacerbation of the problem is the mandatory requirement that all animals, male and female, be neutered or spayed when adopted. This alone, however, will not significantly reduce potential costs or the animal population, but it will eliminate the City Shelter's contribution to the problem.

3. Tattooing — The Ability to Identify an Owner Would Benefit Animal Control

   One of the major problems of animal control concerns stray dogs. Approximately 40 percent of the dogs brought into the Animal Shelter are strays. Less than 10 percent of these stray animals have traceable identification on them; therefore, it is impossible to establish positive ownership for 90 percent of stray dogs. Since it is generally the irresponsible owner who allows pets to run loose, it is also the irresponsible owner who is never identified or forced to assume responsibility for the animal. It is necessary to identify this owner, not only for the welfare of the animal, but also for the benefit that can accrue to the municipality in terms of revenue and management control. The best method of positive identification is tattooing the animal.

   If mandatory spay/neuter is incorporated into an Animal Control program, tattooing can be added easily as a secondary program. While under anesthesia for surgery, a dog can be simply and painlessly tattooed with a permanent and unique number which can be used to identify the owner.

   Tattooing is very desirable for the following reasons:

   • It provides permanent identification of the dog, which should potentially minimize theft and loss.
   • It provides identification of the legal owner of animal.
   • It allows identification of repeat leash law violators.
   • It maximizes usage of shelter facilities by returning a larger percentage of animals to their owners. (It should be noted that modification of the current animal ordinance would be required to allow citing of owners in the absence of contact with the shelter.)
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- It holds irresponsible pet owners proportionately accountable for the added financial burden placed on the community.

4. Ratio of Animals Altered to Population

One major factor affecting the success of a spay/neuter clinic or program is the number of animals altered per year in proportion to the population. Table 3 contains information on programs or clinics that reported a positive impact or reduction in the animal population. Although the ratio refers to the human population and the number of animal surgeries, this ratio indicates how many animals need to be performed to reduce the animal population growth rate.

Since no program or clinic has been in operation long enough or performed enough surgeries per year to report zero growth in the animal population, it is difficult to identify the minimum number of surgeries that should be performed per year to make a program maximally cost-effective and manageable.

5. Restrictions on Income and Financial Need Qualifications

Six survey respondents reported that their program included low-income or financial need qualifications. Only one program, in Annapolis, Maryland, performed enough surgeries to be an effective program. The program in Annapolis also included mandatory spay/neuter of all animals adopted from the shelter. Based on the survey responses concerning the problem and lack of success with low-income restrictions, the program in Annapolis, Maryland, appears to be successful in spite of the restriction on income, rather than because of it. In general, limiting clients based on income criteria is a factor that would handicap a program or clinic.

Conclusion

Stray and unwanted animals create a costly control problem that continues to escalate at an enormous rate. Yet, of all the elements that contribute to the cost of animal control activities, the stray and unwanted animals problem is the one that can be most effectively reduced. The answer is the increased sterilization of the animals that are capable of breeding and creating the overpopulation, resulting in stray and unwanted animals. Although sterilization is available today, not enough pet owners choose to have their animals spayed or neutered because of the cost of the surgery and the lack of education regarding the results of animal overpopulation. Information obtained from a survey of cities that have spay/neuter clinics or programs indicates that a municipally run spay/neuter clinic is an effective means of reducing the growth of the animal population, because it provides low-cost surgery, combined with education programs and legislation, that encourages pet owners to have their animals sterilized.

A municipally run clinic would reduce future operating costs, based on its reduction in the growth of the animal population, and would also provide other indirect benefits. Animal Control personnel would have more time to enforce the Animal Ordinance, which would result in an increase in the percentage of the animal population being licensed. This would also produce additional revenue and reduce the number of violations of lease and licensing ordinances. Such a clinic must provide low-cost spay/neuter surgery to all residents and must also support the veterinary needs of the City Animal Shelter.

In some cities, development of a municipally run spay/neuter clinic has been opposed by local veterinarians, who consider it to be an infringement on the rights of the public sector of their profession. Although education programs sponsored by the Animal Control Division to promote responsible pet ownership would indirectly increase the demand for veterinary services, it is not known to what extent this would offset income lost from those pet owners who would choose to obtain low-cost spay/neuter surgery from a veterinary clinic.

None of the surveyed cities that have successfully developed their own clinic reported any adverse impact on local veterinarians attributable to the clinic. Even if a municipal clinic were to adversely effect income for local veterinarians, the need for reduction in growth of the animal population and the escalating costs of animal control activities warrant the involvement of local government.
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Protection of Animals and Animal Experimentation: A Survey of Scientific Experts

Norbert Lagoni, Joachim Fiebelkorn and Hans-Joachim Wormuth

Norbert Lagoni and Hans-Joachim Wormuth are with the Institute for Veterinary Medicine (Robert von Osterstr Institute) and the Federal Health Office. 100 Berlin 33. Thaliastrasse 68-92. Joachim Fiebelkorn is a graduate in Political Science at the same Institute. This paper is an edited version of a report published by the Federal Health Office in 1983, entitled Tierschutz und Tierexperiment - Durchführung, Bewertung und Aussage (Animal Protection and Animal Experimentation - Performance, Evaluation and Statement). 1981.

This article summarizes information from a survey of biomedical scientists, specifically pharmacologists and toxicologists, on the use of laboratory animals and the potential for replacing their use with alternative methods for the development and evaluation of pharmaceutical substances. The majority of those interviewed felt that the alternatives could supplement or complement animal tests, but not replace the tests altogether. However, most favored the use of nonsentient material in safety tests.

INT J STUD ANIM PROB 4(3) 1983

224
Zusammenfassung


Introduction

To an increasing extent, animal experiments have become a subject of public discussion. There are some social groups who assert again and again that animal experiments are indispensable in many biomedical fields because they can now be replaced by alternative methods. We report how, for the first time in the German-speaking area, scientists of various disciplines, who hold different attitudes toward the problems involved, were surveyed by questionnaire on the subject of toxicological evaluation of pharmaceutical substances using animal tests. Information was sought on the value of animal experiments for safety evaluation in acute, subacute, chronic, mutagenicity, carcinogenicity, and embryotoxicity studies. The questionnaire also asked for the scientists' assessment of alternative methods and their reliability.

Method

Information was collected by means of a written questionnaire between the end of June to mid-August of 1980. The addresses of the persons to be interviewed had been taken from lists of university lecturers, participants at various conferences, and the membership list of the German Pharmacological Society. Additionally, the questionnaire was sent to all medical societies and associations. Questionnaires were sent to a total of 1,526 scientists from the fields of pharmacology and toxicology, veterinary medicine, pharmaceutics, biology, genetics, biochemistry, and physiology. These scientists were affiliated with universities, industry, and governmental and private research institutions. There was a 60 percent (916 questionnaires) response, but only 682 questionnaires were evaluated; the rest arrived too late for analysis or were incomplete.

Disciplines, Experience in Animal Experimentation, and Fields of Activity

The majority of responses came from pharmacologists and toxicologists (53.6 percent), while scientists in pharmaceutics and biochemistry accounted for approximately 10 percent each. Veterinarians accounted for a further 3 percent, with the remainder (about 24 percent) coming from biology or other disciplines. Two-thirds of those responding used animals in experiments. The "typical" period of experience in animal research was found to be between 15 and 20 years, and the majority of these investigators came from the disciplines of pharmacology, toxicology, and veterinary medicine. Of the pharmacologists and toxicologists interviewed, approximately 48 percent of the respondents were affiliated with universities, and only 37 percent were affiliated with industrial establishments.

Results and Conclusions

It is important to note that those whose answers indicated insufficient knowledge were not included in the final calculations of percentages. Of those that remained, it was found that these respondents did not consider that animal experiments could be replaced by alternatives in testing for toxicity at present. They felt that alternative methods, if applicable, could be used as supplements or complements, but not replacements. Also, the majority of those who were surveyed predicted that only small gains could be made in reducing the number of animal experiments. In fact, they argued for a need for more animal experiments and for longer periods of testing, which would result in the use of more experimental animals and an extension of pain and suffering. However, the majority of the respondents were in favor of using material incapable of feeling pain in special (short-term) toxicological studies. There were some noteworthy differences of opinion on a number of issues. Scientists from industry and from universities differed, in some cases, over the length of time necessary for chronic studies: University scientists advocated more extended periods of animal testing. The LD50 statistic was considered to be of great importance by 48 percent of the respondents and of little or no importance by 35 percent of the respondents. A mere 34 percent of the respondents proposed that medical and scientific reasons be considered as the most important criteria in choosing appropriate animal models. Another 34 percent identified economic and regulatory requirements as being more important. Concerning the issue of the number of species required for testing, "two mammal species" was chosen as preferable by 67 percent of those who indicated some knowledge of the issues. However, 21 percent felt that three or more mammals should be used in testing. For acute toxicity testing, 42 percent felt that the follow-up period should be 2 weeks, while 31 percent felt it should be 1 week (or less), and 27 percent chose more than 2 weeks.

On the question of alternatives, the respondents were asked to comment on the application of clinical data as the utility of mutagenicity tests. A small proportion (7.7 percent) felt that data from chronic animal toxicity studies could be completely substituted by clinical data from human studies. Partial substitution was considered possible by 41.4 percent, and 25 percent considered that substitution of animal data was impossible. Concerning the issue of short-term tests for mutagenicity evaluation, 13.1 percent of the respondents expressed their opposition to these tests. Those who accepted short-term mutagenicity tests disagreed over when such tests should be conducted. Some (20.1 percent) felt that short-term tests should always be done, while others favored them only in cases of suspected mutagenic effects (24.0 percent) or in cases when it was anticipated that there would be long-term administration of a drug (17.5 percent).
Zusammenfassung


Introduction

To an increasing extent, animal experiments have become a subject of public discussion. There are some social groups who assert again and again that animal experiments are dispensable in many biomedical fields because they can now be replaced by alternative methods. We report how, for the first time in the German-speaking area, scientists of various disciplines, who hold different attitudes toward the problems involved, were surveyed by questionnaire on the subject of toxicological evaluation of pharmaceutical substances using animal tests. Information was sought on the value of animal experiments for safety evaluation in acute, subacute, chronic, mutagenicity, carcinogenicity, and embryotoxicity studies. The questionnaire also asked for the scientists' assessment of alternative methods and their reliability.

Method

Information was collected by means of a written questionnaire between the end of June to mid-August of 1980. The addresses of the persons to be interviewed had been taken from lists of university lecturers, participants at various conferences, and the membership list of the German Pharmacological Society. Additionally, the questionnaire was sent to all medical societies and associations. Questionnaires were sent to a total of 1,526 scientists from the fields of pharmacology and toxicology, veterinary medicine, pharmaceutics, biology, genetics, biochemistry, and physiology. These scientists were affiliated with universities, industry, and governmental and private research institutions. There was a 60 percent (916 questionnaires) response, but only 682 questionnaires were evaluated; the rest arrived too late for analysis or were incomplete.

Disciplines, Experience in Animal Experimentation, and Fields of Activity

The majority of responses came from pharmacologists and toxicologists (53.6 percent), while scientists in pharmaceutics and biochemistry accounted for approximately 10 percent each. Veterinarians accounted for a further 3 percent, with the remainder (about 24 percent) coming from biology or other disciplines. Two-thirds of those responding used animals in experiments. The "typical" period of experience in animal research was found to be between 15 and 20 years, and the majority of these investigators came from the disciplines of pharmacology, toxicology, and veterinary medicine. Of the pharmacologists and toxicologists interviewed, approximately 48 percent of the respondents were affiliated with universities, and only 37 percent were affiliated with industrial establishments.

Results and Conclusions

An analysis of the disciplines and place of employment of the 682 respondents showed that approximately 40 percent were employed by industry and 40 percent by universities. Approximately 9 percent were employed by other research institutions (e.g., Max Planck Institutes), 6 percent in hospitals, and some 2 percent in governmental regulatory bodies. Of the pharmacologists and toxicologists surveyed, approximately 48 percent were employed by industrial establishments and approximately 40 percent by universities, whereas approximately 61 percent of the pharmacists worked in industry, while only 26 percent were affiliated with university institutions. In contrast, most of the biochemists, veterinarians, and biologists surveyed were affiliated with universities and research institutions.

It is important to note that those whose answers indicated insufficient knowledge were not included in the final calculations of percentages. Of those that remained, it was found that these respondents did not consider that animal experiments could be replaced by alternatives in testing for toxicity at present. They felt that alternative methods, if applicable, could be used as supplements or complements, but not replacements. Also, the majority of those who were surveyed predicted that only small gains could be made in reducing the number of animal experiments. In fact, they argued for a need for more animal experiments and for longer periods of testing, which would result in the use of more experimental animals and an extension of pain and suffering. However, the majority of the respondents were in favor of using material incapable of feeling pain in special (short-term) toxicological studies. There were some noteworthy differences of opinion on a number of issues. Scientists from industry and from universities differed, in some cases, over the length of time necessary for chronic studies. University scientists advocated more extended periods of animal testing. The LD50 statistic was considered to be of great importance by 48 percent of the respondents and of little or no importance by 35 percent of the respondents. A mere 34 percent of the respondents proposed that medical and scientific reasons be considered as the most important criteria in choosing appropriate animal models. Another 34 percent identified economic and regulatory requirements as being more important. Concerning the issue of the number of species required for testing, "two mammal species" was chosen as preferable by 67 percent of those who indicated some knowledge of the issues. However, 21 percent felt that three or more mammals should be used in testing. For acute toxicity testing, 42 percent felt that the follow-up period should be 2 weeks, while 31 percent felt it should be 1 week (or less), and 27 percent chose more than 2 weeks.

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Discussion

These examples indicate that there is considerable divergence of opinion among experts about the use of laboratory animals. This may be due to the lack of any real scientific basis for the design and selection of animal tests for toxicology testing. For various reasons, including concern about the ethical issues regarding use of experimental animals and the performance of animal experiments, there seems to be an urgent need to create a rational basis for animal experimentation in the field of drug safety. Therefore, it is recommended that appropriate committees to address this issue be formed within scientific societies. The present inquiry might provide a basis for such action.

These panels should explore the various kinds of approaches that might be taken to limit or partially omit animal experiments in toxicology in the future. It is important that the inquiry be conducted under carefully defined conditions for each individual field of application (e.g., acute toxicity or mutagenicity). The LD50 test can serve as an example. Experimental animals are undoubtedly needed to determine an LD50. Nevertheless, the general importance of this parameter for risk evaluation is a matter of great controversy, especially in relation to drug testing.

Industrial drug research is already extensively using short-term tests, involving material incapable of experiencing pain, in the screening process of new drugs. Such tests contribute to a reduction in the consumption of experimental animals and to a limitation in the total number of animal experiments. Short-term tests may also be used to study the actions or toxicological profile of an active substance, and they are generally cheaper and quicker.

It is recommended that the importance of, and the conditions for, a more extensive use of alternatives be studied more extensively. This would include coordination of research activities and dissemination of experimental data, as well as the provision of funds to finance specific research projects. At the same time, efforts should be initiated to have the concept of alternative methods included in any new national and supranational legislation that deals with toxicology testing and research.

Zusammenfassung


Sowie diese Absicht bekannt wurde, mobilisierten argentinische Naturschutzgruppen schnell ihre Streitkräfte, planten Media-Kampagnen und führten sie auch durch, holten wissenschaftliche Meinungen von lokalen und internationalen Experten ein und entwickelten eine Strategie für legale Aktionen. Die legalen Taktiken, obwohl zu Beginn erfolgreich, scheiterten schliesslich an einer Schwäche in der argentinischen Justiz: argentinische Staatsbürger können nicht Klagen aus "Klassen Aktionen" vor Gericht bringen. Nur die Regierung hat Jurisdiktion über Sachgebiete,
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die im generellen Bereich liegen, wie Schutz von Wildtieren. So fiel der endgültige Richterspruch dahingehend aus, mit dem Präsidenten von Argentinien Rat zu pflegen, was der Sache der Pinguine zugute kam. Weil der Präsident Unterstützung durch das Volk brauchte, wagte er es nicht, sich gegen die große Übermacht der Wildtiere vor Gericht bringen zu können.

Introduction

During early February of 1982, a local newspaper of Chubut, a Patagonian province of Argentina, published the details of a commercial project on the exploitation of the Magellan penguin, a bird that is of great cultural importance for the people of the area, as well as the general public of Argentina and the international conservation community. So the news initiated the most dramatic controversy ever to take place in Argentina concerning issues related to conservation.

The case is a particularly worthwhile one for analyzing just how local and foreign conservation groups can function together, the tools that were not available for rectifying the situation within the legal system of the country, tools that are also missing from the legal apparatus of many other Latin American countries. In this particular case, the problem concerned penguins. However, in the future, the same sort of controversy might arise over the plight of other species or some environmentally valuable portion of nature. Therefore, the experience gained here should not be allowed to be forgotten, and must be sifted through carefully for the lessons that can be derived from it.

Facts About Penguins

The Magellan penguin (Spheniscus magellanicus) is found mainly on the Patagonian shore of Argentina (Fig. 1 and 2). Although biological data on the species is very scarce, two migratory routes have been observed: one reaches the Uruguayan shore, and the other touches the southern coast of Brazil. Nineteen colonies of birds have been counted; the two main groups are located at Punta Tombo and Cabo Dos Bahias. Both sites are protected as marine reserves, because they were established by the provincial (state) law of Chubut.

The Punta Tombo reserve is the best studied of the penguin colonies. It is the largest colony of its kind, comprising 1 to 1.2 million individuals. According to estimates made between 1974 and 1980, the population has remained stable. Smaller colonies are also developing within the same area, but no one has yet ceased the causal factors that promote colony development. Perhaps they are a result of food limitations in other areas, oil spills, or overall population increases in the species. Very little information is available on the Cabo Dos Bahias reserve, which also belongs to the Province of Chubut. However, the total estimated population of the penguins does not exceed 4 million for the entire Patagonia area.

The diet of the penguins consists of fish, mainly anchovies, along with other marine species such as squid. But the dietary habits of the birds still need to be studied more thoroughly. Their reproductive habits are curiously “nest-site specific,” meaning that, in general, the same individuals will breed as a pair year after year, at the same site as the previous year. The reproductive cycle begins between the ages of 5 and 6 months. Reproduction occurs once a year, and two eggs are laid each time. Death rates for the offspring vary between 40 and 50 percent.

The primary predators of Magellan penguins are several varieties of sea gulls, which prey on the chicks and destroy eggs (these gull species include Larus dominicanus, Stercorarius skua, Leucophaeus scoresbi, and Chonis alba). Secondary predators include sea mammals, such as the sea lion (Otaria flavescens) and the orca (Oncorhynchus orca), and land mammals such as the red fox (Dusicyon culpaeus) and the peludo (Chaptopterus villosus). However, predation by marine mammals has only a very minor impact on the penguin population, because they do not attack the birds very often. Predation by the red fox occurs only at the periphery of the colony, and fox attacks are subject to counterattacks by adult penguins whenever the foxes try to penetrate too far into the central area of the colony. Both the red fox and the peludo attack the young and destroy eggs as well.

Many Argentine newspapers have written about the effects of the oil spills that have occurred in the Southern Sea of Patagonia. (A major oil transport route has been developing in this region ever since the Panama Canal was closed to supertankers.) Oil pollution has become the most important threat to marine wildlife conservation in the area. (Five types of threats are usually considered in wildlife conservation: overexploitation, introduction of exotic species in local habitats, habitat destruction, pollution, and barriers to free movement or migration.) Thick oil slicks have been observed on the Patagonian Sea that reach, in many cases, the valuable coastline of the region. In fact, counts of oiled penguins on the Peninsula Valdes indicate that many thousands of individuals die every year. For example, two wardens, Carlos Passera and Graham Harris, observed 487 dead oil-covered penguins along 1 km of shoreline at Punta Tombo on December 1981.

Apart from the threat caused by pollution, the human population is Argentina has, by and large, been very respectful of the penguin population of Patagonia. But the case reported in this article should alert Argentines to the reality that the possibility of facing another occasion of threat/exploitation remains quite strong. Fortunately, in this instance, the potential for destruction was outweighed by the incredible affection that is felt for the birds by so many individuals and organizations, who have thus confirmed their traditional sense of respect for all wildlife.

Wildlife Conservation Law

In Argentina, two separate legislative systems coexist—there are both federal and provincial systems. But many of the federal laws can also be incorporated into provincial law, after special agreements have been made regarding adherence to particular federal laws by the provinces. However, most of the various conservation acts have not been incorporated into provincial statutes—instead, these laws have been passed by the federal government, but not subsequently accepted by the provinces. It is also important, for our analysis, to make note of several areas for which the federal government retains exclusivity in passing legislation. The Argentine National Constitution establishes that the international and interprovincial trade of goods, any matter related to the sea, and all areas of criminal legislation be vested solely in the federal government. In addition, only the federal government...
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may grant new and fundamental rights to Argentine citizens. Once granted, though, such rights apply equally to all citizens throughout the country. With this general information kept in mind, the analysis of the penguin case can be set within the proper specific legal framework.

Federal Act 22.421, the Fauna Conservation Act, has not been accepted as a provincial statute by the province of Chubut. Yet, as discussed above, some of the norms it establishes are compulsory for Chubut. For example, according to the first article of the federal act, every citizen of the country has a duty to protect all wildlife within the Argentine territory. However, readers from other countries should not confuse this obligation with the sort that grants standing in court to individuals, or groups of individuals, interested in wildlife conservation (through citizen, popular, or class-actions suits). Like the norms set forth in this statute, those of the criminal provisions are in force throughout the nation. Yet, what is defined as criminal depends upon each province’s particular permit system (i.e., a crime would be committed only when the taking of wildlife is expressly forbidden by a particular province; it is not a criminal act when a permit for such an action has been issued for the killing of wild animals).

Federal Decree 1216/74 is also applicable to the whole country; however, it is limited solely to the protection of marine wildlife. As was noted above, the federal government retains absolute and exclusive authority to legislate on marine matters. Its statutes are uniformly compulsory; there is no need for any provincial approval of its decisions. The most relevant federal provision prohibits any taking of marine wildlife before a thorough study of the species’ physiology and behavior has been conducted and analyzed.

To ensure environmental protection of the sea and shore, Argentina ratified the 1972 Convention for the Prevention of Marine Pollution by dumping of waste and other matter. The ratification of this convention does not require provincial approval. Thus, its norms must be complied with throughout the entire Argentine territory. To foster wildlife conservation, the convention includes an article that obligates the participating countries to prevent any dumping of waste or other matter into the sea, if this material is likely to harm “living resources and marine life.” However, there has always been a possibility that Argentina might engage in an international trade in penguins for products and by-products derived from them. Although Argentina has ratified CITES (Convention on the International Trade of Endangered Species), the Magellan penguin is not listed in any of the Annexes of the Treaty, so the federal government has sole responsibility for regulation of any proposed trade in these penguins. (Conversely, two other penguin species are listed in CITES: Spheniscus humboldti and Sphenicus demersus.)

To complete a summary of the applicable law concerning Magellan penguins, it is important to recall that this animal is not protected by provincial law outside the two reserves of Punta Tombo and Cabo Dos Bahas, even though penguins receive federal protection. The uncertain nature of the relationship between federal and provincial law therefore clouds the waters in the penguin case, but one is still compelled to conclude that Federal Decree 1216/74 should be applicable throughout the entire country.

The Commercial Project

Hinode Penguin Argentina, a commercial enterprise, presented a proposed project for the exploitation of the Magellan penguin. One can infer, from the name of the firm and from the name of one of its executives—Yoshinobu Nake-mura—that the firm was jointly owned by Japanese and Argentine entrepreneurs. The president of the firm, Gustavo Larrea, asserted that it belonged entirely to local Argentines. Yet, it was interesting to discover that Larrea was involved at the same time in another company, Hinode SRL, a well-known Japanese import-export firm. This fact is of immense importance in this analysis, because some of the by-products to be derived from the penguins were specifically targeted for the world market. The project included the installation of the two plants. One was to be at Puerto Camarones, where the skinning and boning would be done after the birds had been killed in nearby areas. It was not projected that the killing would take place at any of the protected reserves. The other was to be located at Trelew, where protein would be extracted from the penguin meat. The final extract would then be marketed to the local people as a highly nutritional product. However, the skins were to be sold abroad, for the manufacture of gloves, handbags, and shirts. It was hoped that penguin-skin goods would be considered very sophisticated in many of the Western fashion markets. The project managers estimated that an initial investment of $120,000 would be necessary for the first 2 years, including installation and subsequent operation costs. Labor requirements were expected to involve about 30 to 40 workers.

In order to achieve their projected goals, Hinode hoped to kill 48,000 birds a year during these first 2 years. This initial venture was considered only a pilot experiment. Hinode claimed that continuation of commercial exploitation of the penguins would serve to demonstrate the conservationist attitude of the firm. Since the idea of massive slaughter of penguins was associated in the minds of Patagonians with the old inhumane methods used in sealing and the killing of other sea animals by the British, the firm of...
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The Commercial Project

Hinode Penguin Argentina, a commercial enterprise, presented a proposed project for the exploitation of the Magellan penguin. One can infer, from the name of the firm and from the name of one of its executives — Yoshinobu Nake-mura — that the firm was jointly owned by Japanese and Argentine entrepreneurs. The president of the firm, Gustavo Larrea, asserted that it belonged entirely to local Argentines. Yet, it was interesting to discover that Larrea was involved at the same time in another company, Hi-node SRL, a well-known Japanese import-export firm. This fact is of immense importance in this analysis, because some of the by-products to be derived from the penguins were specifically targeted for the world market. The project included the installation of the two plants. One was to be at Puerto Camarones. Here, the skinning and boning would be done after the birds had been killed in nearby areas. It was not projected that the killing would take place at any of the protected reserves. The other was to be located at Trelew, where protein would be extracted from the penguin meat. The final extract would then be marketed to the local people as a highly nutritional product. However, the skins were to be sold abroad, for the manufacture of gloves, handbags, and shirts. It was hoped that penguin-skin goods would be considered very sophisticated in many of the Western fashion markets. The project managers estimated that an initial investment of $120,000 would be necessary for the first 2 years, including the installation and subsequent operation costs. Labor requirements were expected to involve about 30 to 40 workers.

In order to achieve their projected goals, Hinode hoped to kill 48,000 birds a year during these first 2 years. This initial venture was considered only a pilot experiment; Hinode claimed that continuation of commercial exploitation of the penguins would serve to demonstrate the conservationist attitude of the firm. Since the idea of massive slaughter of penguins was associated in the minds of Patagonians with the earlier inhumane methods used in sealing and, the killing of other sea animals by the British, the firm of...
fered instead several new techniques that, it hoped, would not be considered repugnant to the several humane societies of the country. These included the use of electric-shock devices with special prods and cords, or the injection of “a certain chemical” that would kill the birds in less than 5 seconds (the precise nature of this chemical was never disclosed to the public).

The project was presented by the firm as a completely altruistic venture. In an interview featured in a local English-language newspaper, the Buenos Aires Herald (February 25, 1982), the president of the company asserted that his firm merely “wanted to make good protein available for the public.” Concerning possible world demand for penguin skins, he declared that they had to “produce skins to pay for the production of proteins... this business is not intended for profit making.”

Official Presentation and Government Response

The presentation required for obtaining official authorization for the project was made to the relevant authorities from both the provincial and national administrations. After a meeting with the governor of the province of Chubut, Counteradmiral Niceto Ayerra, and the provincial Fishing Director, Jorge Rio­bap, the executives of Hinode Penguin declared to the press that they felt they had a 95 percent chance of having the project approved, principally because the federal authorities in Buenos Aires had already agreed to the terms of the project. (This pronouncement was published in El Chubut, a Patagonian newspaper.) The relevant federal authority for assessing this kind of issue is the Secretariat of Maritime Trade and Interests, which at the time was directed by Viceadmiral Ciro Garcia.

Although there was approval of the Hinode scheme, there was a legal obstacle—Federal Decree 1216/74—which prohibited any killing of penguins before a thorough scientific study of the species had been conducted. However, the same newspaper article mentioned above also noted that the federal and the provincial authorities had exchanged letters agreeing on the need to repeal the Conservation Decree. The article added that in the meantime Hinode would request a temporary permit, in order to begin construction work and subsequent operation of the plants, and thereby avoid any further delay in the implementation of the project.

In fact, the project was a welcome idea to the authorities involved: their official declarations on the issue demonstrate their wholehearted approval. At a news conference, the governor of Chubut asked (somewhat ironically): What kind of havoc would result if penguins were to begin invading their cities and towns because of “superpopulation”? In addition, Mr. Zattera, spokesman for the secretariat of Maritime Trade and Interests, told the Buenos Aires Herald that lawyers in his department were already studying plans for having Decree 1216/74 declared unconstitutional, and thereby conveying to the provincial authorities the exclusive right to make a judgment in the matter. Such a change in jurisdiction would enable the governor of Chubut to permit the penguin exploitation to go forward.

Policy Process and Citizen Action

Once the nature of this commercial project had been publicly disclosed, however, there were all kinds of strong reactions. The first symptoms of public indignation were expressed by Chubut’s local newspapers, which emphasized the spiritual values of the penguin population, and noted that economic benefits should not be the only factor considered in deciding on the future of the community’s activities. In this particular case, they felt that preservation of the pen-
guins was more important than exploitation, since people’s satisfaction and well-being had to be considered in any decision. And it seemed obvious, from the various statements made by the local inhabitants, that their affection for the birds outweighed their desire for any economic benefits that might accrue from the project.

At the same time, the conservation movement of Argentina began rapidly to mobilize its resources. Not all of the groups acted in concert, perhaps because of the present political situation: Argentines belong to an especially segmented society. Nevertheless, each of the groups played a significant role in the effort that was necessary to prevent penguin slaughter. Some of these groups focused their programs on the media, and concentrated on presenting scientific arguments. Other organizations used different methods, such as exerting pressure on governmental authorities at both federal and provincial levels. Finally, a few made use of every possible international connection that they felt might be able to help exert a direct influence on the country. The three approaches were all highly appropriate and effective. Above all, they served to remove any intermediate obstacles, so that the final move, the legal presentation, was able to effect a positive outcome.

There were numerous private associations that intervened on behalf of the birds. Yet, only five of these were truly visible and active. These were the Plate Ornithological Society, the Argentine branch of the International Council of Bird Protection (ICBP), the Natura Association for Nature Conservation, the Argentine League for Animal Protection, and the Argentine Wildlife Foundation (FVSA). It was the Wildlife Foundation that played the most active part in stopping the penguin slaughter. They utilized all of the techniques described above, and were even able to counteract the
ffered instead several new techniques that, it hoped, would not be considered repugnant to the several humane societies of the country. These included the use of electric-shock devices with special prods and cords, or the injection of "a certain chemical" that would kill the birds in less than 5 seconds (the precise nature of this chemical was never disclosed to the public).

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economic pressures that Hinode exerted on the governmental authorities. Among other things, they publicized the opinion of the most widely recognized ornithologist in the country, Dr. Kalos Oloog of the University of Tucumán in northwestern Argentina. FVSA had a dramatic impact on the international conservation community as well. Their worldwide contacts resulted in an immediate response from major world organizations, which then took highly effective action. For instance, Dr. William Conway, Director of the New York Zoological Society, Bernardo Zentilli from the International Union for the Conservation of Nature, Dr. Claus König from the Deutscher Bund für Vogelschutz, and Dr. W. Engelhardt from the Deutscher Naturschutzbund all wrote to express their scientific opinion on the proposed exploitation of penguins to the Argentine movement. In addition, concerned individuals from many countries, such as the well-known actress Bridget Bardot, expressed their sense of alarm about the project, to both public and private entities in the country. Furthermore, the action they undertook in their own countries served to focus the attention of the world media on Argentina's penguins.

All of these efforts, whether national or international in scope, were ultimately directed toward preventing the killing of the penguins by defeating the idea of repealing federal Conservation Decree 1216/74.

Opinions of Government Scientists

On February 5, 1982, Dr. Ricardo Bastida, from the National Institute of Fishing Research (INIDEP)—the official scientific research agency, declared in Telex 17 that the institute opposed the penguin exploitation project, based on an official position that had previously been taken by the agency on the matter (Jornada, February 6, 1982). His statements reassured both the conservationists and the tourist organizations. In addition, the same article included a statement of opposition to the project from another scientific institution (also governmental), the National Patagonian Center.

Then, on February 1, 1982, INIDEP revealed its earlier position. They sent a second Telex (no. 20), signed by Navy Captain Alberto Casellas, who had been appointed director of the institute by the military government, which stated that INIDEP had never publicly declared its opposition to the penguin project, in regard to the feasibility of commercial exploitation of the birds.

One can see, from these two contradictory statements, issued by the same official institute, how scientific truth is often manipulated to satisfy powerful economic interests, which are in turn associated with governmental authorities. To a certain extent, this phenomenon happens everywhere in the world. Yet, in the particular instance of Argentina, one should remember that the country is ruled by a military dictatorship, so that any project, once approved by a few high-ranking military officers, becomes very hard to stop. But, at the same time, it is also common to find people working at the same official institutes who do not respond to political inspired pressure. Dr. Bastida from INIDEP, for example, honestly expressed the policy that the institute had been following for years, before the situation created by the proposed Hinode project had arisen. But the public disclosure of INIDEP's scientific assessment was counterproductive to the interests of Hinode. Penguin, as well as their official counterparts. As a result, Dr. Bastida was not permitted to clarify his position, after his director had made his own declaration in Telex 20.

Full recognition of this situation has taught those in the Argentine conservation movement that they must work in close harmony with those scientists in the official national organizations who have the right to disclose information and to express scientific opinions.

Arguments and Counterarguments

Different groups tended to emphasize different values in the battle for the preservation of the penguins. Some based their criticism on ethical grounds; others cited scientific evidence to counter that promulgated by backers; and others formulated sound economic and legal arguments to refute the supposedly beneficial and altruistic motives claimed by Hinode.

On ethical grounds, many claimed that Chubut was sufficiently rich to dispense with the idea that it was necessary to exploit penguins as a food resource. In addition, there was a general suspicion among the local population that the entire penguin deal was principally aimed at satisfying the world fashion market, by supplying penguin skins to the leather industry for fabricating elegant gloves, handbags, and shirts. These products seemed, to local sensibilities, to be too luxurious to justify an economically based war on a species that might result in its extinction. They realized that this threat arises every time commercial exploitation of wildlife begins to earn. On the same basis, many rejected the whole idea of considering penguins solely as a potential food resource and thereby dismissing their value to those who enjoy watching wildlife; penguins are also economically important to the tourist industry.

For its scientific arguments, FVSA collated various opinions from leading national and international authorities, and were thus able to refute Hinode's scientific presentation. FVSA submitted a comprehensive document on the issue, which provided a detailed counterargument. This is summarized below.

1. Hinode justified the killing of the birds by asserting that it had estimated that there was an "excess" population of 12 million individuals, adding that 10 million of these were distributed outside the two provincial reserves. FVSA, in turn, reminded Hinode that, until the present, the only extent studies had shown that, at most, the penguin population was approximately 4 million; 1.2 million were counted at the Punta Tombo reserve. They noted further that the reserve includes the largest penguin colony in the world. In any case, they distrusted Hinode's penguin population data because the time spent collecting it was too brief for a careful study of population dynamics (since the firm's activities had only recently begun, there could not have been sufficient time for rigorous investigation). Regarding Hinode's contention about a possible penguin "invasion" of towns and cities (due to "superpopulation"), any educated reader can easily guess FVSA's reply, based on simple principles of ecology.

2. Hinode claimed that the reason for the supposed increase in the penguin population was the reduction in numbers of its natural predators—among them, seals, sea elephants, orcas, skus, whales, and red foxes. FVSA responded by noting that neither seals nor sea elephants have any more than occasional encounters with the penguins of that area, so that any change in the population counts of these mammals is irrelevant to an evaluation of penguin population dynamics. Regarding the orca, scientists have found that its population has remained stable over time. Although it is true that red fox numbers have diminished, this animal only preys upon the peripheral areas of penguin colonies, attacking chicks and destroying eggs, and thus has only a relatively small impact on the penguin population. The skua, however, is an active predator of penguins. Yet, in contradiction to Hinode's claim, its population has actually been increasing recently, along with several other sea gull species. Finally, and somewhat ludicrously, FVSA had to remind Hinode that baleen whales do not feed on penguins for obvious biological reasons (their diet consists mainly of krill).

3. Hinode argued that the Magellan penguin consumes, on a yearly basis,
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3. Hinode argued that the Magellan
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720,000 tons of anchovies, thus devastating fishery operations and jeopardizing the marine ecological balance. FVSA refuted this by stating that no known study supported such an inflated figure; even the highest estimates of the amount of anchovies consumed by penguins did not exceed 150,000 tons. Hinode also declared that humans are placed in a disadvantageous position in competing with penguins for anchovies. FVSA simply replied that, to their knowledge, there is no species in nature that can successfully compete with modern human fishing techniques.

4. Regarding the killing methods to be used by Hinode, FVSA declared that this issue was an irrelevant consideration, since their main objection was the highest estimates of the amount of anchovies consumed by penguins. Hinode also declared that humans are placed in a disadvantageous position in competing with penguins for anchovies. FVSA simply replied that, to their knowledge, there is no species in nature that can successfully compete with modern human fishing techniques.

The most effective legal tactic was employed by the filmmaker Juan Schroeder, who hired two attorneys who are now specializing in wildlife issues, Alberto Kattan and Luis Marga. They invoked their right to be heard in court, based on the statute-dictated duty of every citizen in the country to protect local and native wildlife (Article 1, Law 22,421). In addition, based on the hypothesis that both national and provincial authorities were trying at the time to repeal Conservation Decree 1216/74, they requested an injunction against any possible action aimed at setting up an industry to process slaughtered penguins, before the necessary biological studies had been completed (an obligation compelled by law). Moreover, they argued that the right to human life was guaranteed by the National Constitution, and then asserted that penguin and human life are intertwined in a complex way, in the ecosystem perspective of life on earth. Surprisingly, the court did not reject their claim, and thus proceeded accordingly—at least at the outset of the proceedings.

Conclusions and Recommendations

This battle was won on political, not legal grounds. The legal case was but one tool used by an interest group as one means of exerting pressure on the government authorities. In fact, it was only through combined pressure that the highest authority in the country was forced to confirm the applicability of the existing conservation law. This decision, however, does not preclude future attempts of Hinode to continue work on its project.

The case taught Argentines that concerted action can achieve positive results in conservation and environmental protection. Yet, it also revealed to them that they lack a very special and valuable
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The most important group to argue against the Hinode plan on economic grounds was the tourist industry of Chubut. Tourist industry representatives insisted that, because of the penguin colonies in the province, about 300 people visited the area each day and asserted that this rate had been increasing steadily. For example, during January 1982, 7,886 tourists had visited the region, as compared with 5,884 for the same month in the previous year. The tourists who visited the region not only paid a fee for observing the birds, but also participated in many other kinds of activities in the province. The tourist organization showed that Hinode's investment of $120,000 was a negligible sum, compared with the multi-million-dollar tourist industry in the area.

Dr. William Conway offered another consideration, which was useful for macroeconomic analysis of the whole province. He said that any authorization for a penguin-processing industry, under the present regulatory system, would obviously require a strict system of control. The added costs for the requisite scientific supervision and oversight of the area would thus outweigh any taxation income to the province that might accrue from the penguin industry. Instead, money spent on improving the tourist infrastructure and wildlife preservation would result in greater revenues for the provincial government.

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Finally, most of the conservationist groups in the country informed those in Chubut about the case, and pressure was exerted. The national Conservation Decree 1216/74 was revised, and the courts eventually decided to affirm the behavior of the Hinode firm.

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Alternatives to Animal Experimentation

Steven M. Niemi

Alternatives to animal experimentation are highly touted today by animal welfare advocates. Their campaign for adoption of alternatives has caused much discussion and debate within and outside of the biomedical community. The purpose of this paper was to examine the controversy and assess the more common alternatives, including the bacterial mutagenicity assay or Ames test, cell culture, and mathematical models for toxicity prediction. Safety testing of chemicals is the most promising field of alternatives where laboratory animals are used, and incorporation of alternatives with live-animal assays is increasing. However, due to limitations of alternatives in use currently, there is still considerable need for in vivo systems. The veterinarian is central to the question of alternatives, in terms of humane considerations as well as the usefulness of animals in science. An effective role for the veterinarian is to serve as educator and mediator between the scientist using laboratory animals and the animal welfare proponent.

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Introduction

Animals have been used by man for at least several centuries to obtain knowledge. As that knowledge further revealed the unity of Earth’s life forms, animals were used in increasing numbers in the laboratory as surrogates for humans. Although the benefits of animal experimentation were sometimes not immediately apparent, the laboratory animal has contributed greatly to the welfare of humans as well as other animals (Bustad et al., 1976; Migaki, 1981). Today, animals are used in education, research diagnosis, testing compounds for efficacy and safety, and production of biologics. There are currently 40 to 90 million laboratory animals in use in the United States, 80 to 90 percent of which are rodents (Institute for Laboratory Animal Resources, 1980; Rowan, 1981a).

Opposition to the use of animals for obtaining knowledge is as old as animal research itself. Motives for opposing animal experimentation include belief in the absolute rights of animals, humanitarian motives, scientific motives, economic motives, and legal motives.

The moral and ethical arguments of antivivisection and animal welfare advocates center around whether there are any legitimate grounds for inflicting any pain, intentionally or otherwise, on animals for intellectual gain. Other proponents of animal welfare have adopted a more moderate view (Fox, 1981; Rowan, 1981b). While recognizing the contributions science has made to humanity through animal experimentation, this faction is concerned about wasteful, exceptionally cruel, or unnecessary use of laboratory animals, and their aim is to curtail these abuses (Rowan, 1980b). The most eloquent (and least offensive to the biomedical establishment) program for reducing “inhumanity” to laboratory animals was formulated by Russell and Burch (1959). They presented a concept of the “3 Rs” - Replacement of laboratory animals with suitable alternative methods, Refinement of research or test protocols to lessen animal suffering, and Reduction in the number of animals used. This creed has been adopted by both sides of the laboratory animal welfare issue as a worthwhile goal (Rowan, 1980b; Smyth, 1978).

Traditionally, the antivivisectionist attitude has meant general opposition to biomedical research. This is because there were few adequate substitutes available for the live animal which, historically, was the conventional tool of science. But recent advances in electronic and in vitro technology, coupled with a vast extension of our knowledge at the cellular and subcellular levels of biology, have provided substitutes for laboratory animals in many instances. These advances have been seized upon (ironically) by many in the animal welfare community as justification for replacing the laboratory animal. Therefore, any further use of animals for science, in their minds, is unnecessary. Moderate voices in the movement have also been encouraged by these scientific achievements, and there is increasing overlap in the application of these technologies in the place of animals. Scientific and economic motives are also playing an increasing role in the transition from animals to alternatives.

Scientific objections put forward by researchers and animal welfare advocates include: (1) the variability among mammalian species in anatomy, physiology, and behavior; and (2) the variability among animals of the same species due to genetic and environmental factors, and thus the applicability of the results obtained to human health (Rowan, 1981a; Lang and Vessell, 1976). Economic motives will be addressed later in the paper. Unlike the situation in other nations, there are no legal incentives for adopting alternatives in the United States (Smyth, 1978; Anon., 1981a).

There is another reason for promoting alternatives - namely, the problem of environmental pollution and its effect on public health. Approximately 63,000 chemicals are in use today, with 1,000 new ones being added each year. It is also estimated that 80 percent of all human cancer is of environmental origin and that only 7,000 chemicals have been tested (adequately or otherwise) for carcinogenicity (Rowan, 1981a). One can thus see the enormous backlog of safety evaluation that needs to be addressed. It has been calculated that with current in vivo testing resources, only 500 additional compounds could be tested each year. In addition, animal assays for carcinogenicity and toxicity require an investment of over 800 animals, at least 3 years, and $150,000 to $500,000 per compound (Rowan, 1981a; Muhl et al., 1976). To test those compounds commonly exposed to humans as well as compounds new to society would cost over 2 billion dollars and require over 1.6 million animals, using conventional assays (CSPCA, 1980). Therefore, there is a critical need for faster and cheaper tests to detect carcinogens, at least at the initial stages of evaluation.

The pressure from these problems will also force the animal welfare argument in hastening any transition to alternative methods of testing.

The purpose of this paper is to discuss the current situation regarding the alternatives controversy and examine strategies used to encourage the adoption of alternative methods in science. Some of the more common alternatives will be mentioned, and comments will be made on the role of the veterinarian regarding this issue.

The concept of alternatives is best defined in the context of the 3 Rs (Rowan, 1980b). Replacement is the most obvious and most common goal for those in the animal welfare field, but there are notable examples of alternatives involving different approaches. One example of Reduction is the pooling of resources in nonhuman primate research as described by Moor-Jankowski et al. (1980). In this system, the animals serving as negative controls or “sentinels” for infectious agents were used as sources for biological materials by other investigators. An example of Refinement is the alteration of the mouse assay for tetanus antitoxin in Great Britain. Formerly, a lethal end point was required in mouse inoculation tests for the positive controls. But since 1977, the British Pharmacopoeia has recommended a paralytic end point, in which the mouse suffers only a temporary and mild hind-limb paralysis and eventually recovers completely (Rowan, 1981a).

While adversaries agree on the attractiveness of the 3 Rs, how quickly and by what means they are achieved is a matter of great disagreement. The scientific community has maintained that successful alternatives have arisen from within science by intellectual insight and tedious research, without the need for external prodding. When deemed acceptable, these alternatives have been quickly adopted and, it is argued, this approach will continue to be just as fruitful and dependable in the future (Gowans, 1974; Smyth, 1978; Grafton, 1981).

However, those concerned primarily with animal welfare are not satisfied with the pace of alternatives research and development and have sought other routes to achieve their goals. These routes include confrontation, collaboration, and legislation. Each will be discussed in turn.

Confrontation

An example of confrontation on a national scale is the recent campaign against the Draize test. The Draize test is the accepted eye irritancy test; it is required for all compounds intended for human ocular or conjunctival use, or where exposure to human eyes is likely. The rabbit is the test subject, and the compound to be evaluated is instilled in the conjunctival sac of one eye, the other eye serving as the negative control. Before 1982, standard protocols called for the use of six to nine rabbits per compound, but recent guidelines have...
Introduction

Animals have been used by man for at least several centuries to obtain knowledge. As that knowledge further revealed the unity of Earth’s life forms, animals were used in increasing numbers in the laboratory as surrogates for humans. Although the benefits of animal experimentation were sometimes not immediately apparent, the laboratory animal has contributed greatly to the welfare of humans as well as other animals (Bustad et al., 1976; Migaki, 1981). Today, animals are used in education, research diagnosis, testing compounds for efficacy and safety, and production of biologics. There are currently 40 to 90 million laboratory animals in use in the United States, 80 to 90 percent of which are rodents (Institute for Laboratory Animal Resources, 1980; Rowan, 1981a).

Opposition to the use of animals for obtaining knowledge is as old as animal research itself. Motives for opposing animal experimentation include belief in the absolute rights of animals, humanitarian motives, scientific motives, economic motives, and legal motives. The moral and ethical arguments of anti-vivisection and animal welfare advocates center around whether there are any legitimate grounds for inflicting any pain, intentionally or otherwise, on animals for intellectual gain. Other proponents of animal welfare have adopted a more moderate view (Fox, 1981; Rowan, 1981b). While recognizing the contributions science has made to humanity through animal experimentation, this faction is concerned about wasteful, exceptionally cruel, or unnecessary use of laboratory animals, and their aim is to curtail these abuses (Rowan, 1980a). The most eloquent (and least offensive to the biomedical establishment) program for reducing "inhumanity" to laboratory animals was formulated by Russell and Burch (1959). They presented a concept of the "3 R's": Replacement of laboratory animals with suitable alternative methods, Refinement of research or test protocols to lessen animal suffering, and Reduction in the number of animals used. This creed has been adopted by both sides of the laboratory animal welfare issue as a worthwhile goal (Rowan, 1980b; Smyth, 1978).

Traditionally, the antivivisectionist attitude has meant general opposition to biomedical research. This is because there were few adequate substitutes available for the live animal, which, historically, was the conventional tool of science. But recent advances in electronic and in vitro technology, coupled with a vast extension of our knowledge at the cellular and subcellular levels of biology, have provided substitutes for laboratory animals in many instances. These advances have been seized upon (ironically) by many in the animal welfare community to press for replacement methods for the laboratory animal. Therefore, any further use of animals for science, in their minds, is unnecessary. Moderate voices in the movement have also been encouraged by these scientific achievements, and there is increasing叫l support for these technologies in the place of animals. Scientific and economic motives are also playing an increasing role in the transition from animals to alternatives.

Scientific objections put forward both by researchers and animal welfare advocates include: (1) the variability among mammalian species in anatomy, physiology, and behavior; and (2) the variability among animals of the same species due to genetic and environmental factors, and thus the applicability of the results obtained to human health (Rowan, 1981a; Lang and Vessell, 1976). Economic motives will be addressed later in the paper. Unlike the situation in other nations, there are no legal incentives for adopting alternatives in the United States (Smyth, 1978; Anon., 1981a).

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However, those concerned primarily with animal welfare are not satisfied with the pace of alternatives research and development and have sought other routes to achieve their goals. These routes include confrontation, collaboration, and legislation. Each will be discussed in turn.

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reduced the number required. The eyes are monitored for up to 3 weeks, and develops is scored quantitatively (Interagency Regulatory Liaison Group, 1981).

Photo Objections to the in vivo assay included the facts that: (1) too many rabbits were used repeatedly; (2) at higher doses, some of the compounds were extremely irritating or even necrotizing; and (3) no anesthesia was usually provided to the rabbits. The cosmetics industry was a special target of the anti-Draize campaign because the Draize test was extensively employed in the manufacture of eye makeup, hair sprays, and other similar products. Since there are already many such products available to consumers, Draize opponents felt that subjecting more rabbits to discomfort for the development of new beauty products was a needless consequence of human vanity (Harriton, 1981).

As a result of the anti-Draize campaign, the Revlon Company donated $750,000 to Rockefeller University to finance a 3-year program to develop an alternative to the Draize test. Shortly after Revlon’s gift was made, the Cosmetics, Toiletry, and Fragrance Association established a fund, eventually totaling over 1 million dollars, to be managed by the Johns Hopkins Center for Alternatives to Animal Testing (Anon., 1982a).

There are also scientific objections to the Draize test (Simons, 1980). Rabbits are suspect in their ability to detect moderate irritants, although they can be used to distinguish between severe irritants and non-irritants. Although there are no alternatives to the Draize test currently available, some techniques are being investigated. These include evaluating in vitro cytotoxicity in established cell lines upon exposure to the irritant (Simons, 1980), and measuring serotonin release from irritated rat peritoneal ma-

**Collaboration**

The second strategy used by animal welfare advocates is collaboration. Certainly this is more palatable to the scientific community and has been more favorably received. Animal welfare organizations have actively participated in recent scientific symposia on laboratory animals and alternatives, e.g., the Animal Welfare Institute, the Canadian Society for the Prevention of Cruelty to Animals, and the Fund for the Replacement of Animals in Medical Experiments, among others (National Academy of Sciences, 1977; Rowan and Strattmann, 1980; CSPCA, 1980).

Another approach involving collaboration is the direct financing by animal welfare organizations of scientific research on alternatives. Most of these ventures have not been as fruitful as hoped, but the mere fact that animal welfare groups are participating in this manner is important and should be encouraged. It indicates a reversal of values, in that organizations that were previously suspicious of science in general are now turning to science for assistance. Even if no breakthroughs are achieved, these sponsors will gain a better understanding of the scientific method, the necessity and value of controlled experimentation, and perhaps an appreciation for the disadvantages as well as the advantages of alternatives in certain situations. One noteworthy contribution arising from private support is the in vivo tumorigenicity test developed by Petricciani and others and sponsored by the American Fund for Alternatives to Animal Research (Noguchi et al., 1978).

**Legislation**

A third strategy employed by animal welfare groups is advocacy for legislation. Presently, there are three sets of federal regulations pertaining to the husbandry of laboratory animals: the United States Department of Agriculture’s Animal Welfare Act, the Food and Drug Administration’s Good Laboratory Practice, and the National Institutes of Health’s Guide for Grants and Contracts, which includes animal care policies (Towens, 1980). None of these programs regulates research per se but, rather, defines the framework of laboratory animal use within which that research must be conducted.

There are several bills in the current session of the United States congress that pertain to the promotion of alternatives to laboratory animals, and all have originated from or have the support of at least some groups from the animal welfare lobby (Randall, 1981; Anon., 1981b). Advocates of these bills contend that the current level of animal experimentation grossly exceeds the need for such use. They argue that acceptable alternatives exist today and that adoption of these alternatives is slowed by convention, bureaucratic inefficiency, and the lack of “encouragement” for using alternatives (Broad, 1980). Thus, they believe that some central agency or federal directive is needed to expedite the transition to animal replacements.

Many biomedical administrators and scientists oppose such legislation because they feel it is unnecessary, cumbersome, and duplicative. All of the replacements for animals in use today were developed in the laboratory in response to a greater need for specificity and sensitivity. The need still exists but, in their opinion, it would be wrong to believe that by mandating the process and providing more money the system would be any more productive (Broad, 1980; Anon., 1982b).

**How Do Alternatives Compare with Animals?**

The common alternatives used by science as well as promoted by animal welfare activists can be classified as follows: physicochemical techniques, microbial systems, in vivo eukaryotic systems, in vivo eukaryotic systems, computers and mathematical models, and expanded clinical and epidemiological studies in humans.

Physicochemical techniques involve the use of radioactive isotopes, gas-liquid chromatography, and mass spectrometry. It has been argued that these techniques do not substitute for animals, but make results obtained with animals more specific and provide more valuable information (Smyth, 1978). It is also suggested that rather than reduce the number of animals used, physicochemical techniques may actually, in some instances, increase the need for more animals, due to the new questions they may pose to an investigator. However, others have documented examples where physicochemical techniques have replaced animals—as in vitamin A bioassays (Rowan, 1981a).

This illustration, on a small scale, the problem of determining just how successful computer systems, in vitro systems, and clinical studies can be as alternatives to animals. Space is too limited here for detailed analyses, and the reader is referred to several books that have appeared on the subject in recent years (Rowan and Strattmann, 1980; Smyth, 1978; National Academy of Sciences, 1977).

How do in vitro systems compare with the laboratory animal in terms of sensitivity or specificity? The most realistic comparison to be made is in the safety testing sector, since the purpose and end points involved here are agreed upon by most. Research, on the other hand, entails more personal choice and therefore more varied endeavors which do not always offer the same opportunities for transposition between animals and alternatives. Most in vivo systems for detecting carcinogenicity in a compound exhibit 50 to 90 percent agreement with the in vivo results (Bridges, 1976; Ames and Hooper, 1976, Anon., 1980a). One study in which one laboratory
reduced the number required. The eyes are monitored for up to 3 weeks, and develops is scored quantitatively any lesions or evidence of irritation that S. ageney Regulatory Liaison Group, 1981). bits were used repeatedly; (2) at higher was a special target of the anti-Draize and (3) no anesthesia was usually to the rabbits. The cosmetics industry for the prediction of animals, and alternatives, e.g., the Animal Welfare Institute, the Canadian Society for the Prevention of Cruelty to Animalsw, and the Fund for the Replacement of Animals in Medical Experiments, among others (National Academy of Sciences, 1977; Rowan and Stratmann, 1980; CSPCA, 1980). Another approach involving collaboration is the direct financing by animal welfare organizations of scientific research on alternatives. Most of these ventures have not been as fruitful as hoped, but the mere fact that animal welfare groups are participating in this manner is important and should be encouraged. It indicates a reversal of values, in that organizations that were previously suspicious of science in general are now turning to science for assistance. Even if no breakthroughs are achieved, these sponsors will gain a better understanding of the scientific method, the necessity and value of controlled experimentation, and perhaps an appreciation for the disadvantages as well as the advantages of alternatives in certain situations. One noteworthy contribution arising from private support is the in vitro tumorigenicity test developed by Petricciani and others and sponsored by the American Fund for Alternatives to Animal Research (Noguchi et al., 1978).

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The Bottom Line

To summarize the controversy, there are two points where enlightened spokespersons for and against animal use can agree: (1) animals will be required, if not desired, in the laboratory for some time to come, most notably in research; and (2) no substitute for the entire live animal currently exists because the in vivo state is too complex and too poorly understood at this time. It should be appreciated that the greatest promise for alternatives lies in those disciplines that focus on particular biological phenomena not requiring live animal subjects. Much of biology has advanced to a level of sophistication where the animal may serve only as a source of biomaterials for in vitro investigations, or where abiotic methods are preferred. An example of the former is the rapid adoption of monoclonal antibody technology, replacing rabbits and other mammals as a means of producing antiserum (Kennett, 1981). But there remain fields of study that depend, at least in part, on the live animal and all of its intricate interplay among physiologic systems. These fields include experimental surgery and ethology.

Conversely, the points of disagreement center around (1) the current degree to which animals are used, given that there are alternatives applicable to specific biological processes that we already understand: and (2) the paucity of support given to alternatives in general (Rowan, 1981b).

But a consistently major point of debate is the quality of care that laboratory animals receive, as well as the attitudes of those who use them. In support of those who argue that progress is too slow in providing better care for laboratory animals, a national survey of laboratory animal facilities noted that fewer facilities than expected had become accredited by the American Association for Accreditation of Laboratory Care in the last 10 years (ILAR, 1980). Furthermore, laboratory animal veterinarians have complained of the reluctance of grant recipients or administrators to devote an adequate proportion of their funds to housing and care of animals (Leeper, 1976). On the other hand, the same national survey confidently predicted continued growth of the veterinary labor force in laboratory animal medicine (ILAR, 1980).

The Laboratory Animal Veterinarian

What role should the laboratory animal veterinarian play in the alternatives controversy? Or, should a role be assumed at all? Since his or her position is central to laboratory animal welfare, the veterinarian will become involved by force of circumstance if not by design. The responsibilities of the laboratory animal clinician have grown enormously in the last decade, partly in response to client concern for animal health and welfare from within and outside scientific confines. In addition to managing the laboratory animal colony, he or she may be expected to advise investigators on the appropriateness of particular animal models and on which ones to use in specific experiments; to instruct investigators on the proper handling of animals; to assess protocols involving animals; to implement and monitor policies to comply with federal regulations on animal care and housing (Bradbury, 1980); and to justify the use of animals in the laboratory. In this last regard, the veterinarian's position has become more politicized and the trend will likely continue. In most instances, the defense of animal experimentation has been retrospective in scope, in that historical examples of biomedical advances that were achieved with animals are offered as evidence. It is then argued that similar advances in the future must also utilize animals (Miągaki, 1981).

As more scientists turn to alternatives, for whatever reasons, and as more scientists become sympathetic to the animal welfare "cause," laboratory animal veterinarians will have to adopt new viewpoints, of a prospective nature, to be able to discuss intelligently the potential and limitations for both in vivo and in vitro systems. In addition, they will likely have to work in closer conjunction with animal welfare representatives in performing their duties. This is already being done in Canada on a national scale, outside of any federal directive (Rowell, 1980; Anon., 1980b). Involvement of the animal welfare community in laboratory animal care and use is an important development, and it is necessary if the two sides are to find common ground or minimize further conflict and misunderstanding. The actual day-to-day activities of biomedical research and testing are often poorly presented to the public (Rowan and Stratmann, 1980). If the public is concerned with the welfare of laboratory animals, their ignorance of what actually occurs in the vivarium and laboratory can only harm the image of biomedical science and further increase the public's suspicions. This is especially true when their suspicions are confirmed, as occurred in the recent Silver Spring animal cruelty case (Kershner, 1982).

As a partial remedy to the information gap, some suggest publishing detailed husbandry protocols in addition to experiments, so as to better inform the reader (and public) on how the animals were cared for and used in the research. Others encourage more interaction between scientists and animal welfare advocates to accommodate the concerns of both sectors of society; again, the laboratory animal clinician's role is pivotal. Public relations and education may well become a major duty of the laboratory animal veterinarian in the near future (Loew, 1981).

The Veterinarian in Private Practice

What of the private veterinary practitioners? They may also become involved in the controversy surrounding alternatives through discussions with concerned clients or in consultations with local humane organizations. Some of the more sensational animal welfare groups distribute literature containing photographs of cute pets or mutilated carcasses of companion animal species, and accuse science of butchery. The client is often the recipient of such literature and will ask his or her veterinarian about the charges. Similar articles in the communications media will also concern the client, as well as clients with animal welfare advocates that the poor condition of animal life is unnecessary today since cell cultures and computers can substitute completely for the laboratory animal. Hope-
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Conclusion

In many instances, animal experimentation has been or is being minimized; there are many more opportunities for utilizing alternatives (in all aspects of methodology) than are being utilized. The best way to approach a problem is to consider all aspects of one's work and to educate the client (and the biomedical industry) for utilizing alternatives (in all aspects of methodology). The prevention of cruelty to animals, Montreal, Canada


References


fully-the practitioner will seize the opportunity to perform a service for his profession (and the biomedical industry that supports it) by educating the client or the humane society chapter in his town on the complexities of the issue.

Conclusion

In many instances, animal experimentation has been or is being minimized; there are many more opportunities for utilizing alternatives (in all aspects of the concept). However, in many cases, animal research still proves to be the best way to approach a problem. Suppression of the utilization of any resources, be they laboratory animals or alternatives, imposes a serious limitation on scientific progress for human welfare.

References


Anonymous (1980a) Alternative carci­


Anonymous (1982a) Johns Hopkins to es­


tice regulations: how to use them. Lab Anim 9(4):30-33.


Point-Counterpoint: Draft Australian Code of Animal Welfare and Response by Australian Federation of Animal Societies

As reported previously in these pages (Int J Stud Anim Prob 3(3):250, 1982), the Australian Standing Council on Agriculture (SCA) recently concocted a draft version of a new animal welfare code, comprised of four sections:

1. The Pig
2. The Domestic Fowl
3. Road Transport of Livestock
4. Rail Transport of Livestock

Since the codes are the work of the SCA, a body made up of the state and federal ministers responsible for agriculture, the proposed codes will never officially come under the domain of the Australian federal government. Instead, they must be adopted by each of Australia’s separate states. Nor, as Peter Singer noted in the Winter 1982 edition of Int J Stud Anim Prob, does there appear to be any mechanism for making a breach of the codes an automatic offense. “At most,” Singer observed, “it seems that it [failure to comply with the codes] might be evidence that could be used in a prosecution for cruelty.”

After perusing the actual content of the codes, Singer concluded that they were woefully inadequate, furnishing only a bare minimum of protection for the physical health of animals, while virtually ignoring their behavioral and other welfare-related needs and, among other things, acknowledging and condoning many of the practices that are now considered integral to maintaining a profitable factory farm operation.

Writing for the Australian Federation of Animal Societies, Singer therefore prepared a detailed critique of the codes, suggesting modifications that would help to convert the codes into a practicable tool for ensuring that livestock have a better chance at a guaranteed minimum number of carefully defined rights.

A summary of the important passages in the codes, and the relevant changes suggested by the Federation for that section, are given below.

1. The Pig

The code begins by listing what are assumed to be “the basic needs of pigs”:

- Readily accessible food and water to maintain health and vigor
- Freedom of movement to stand, stretch, and lie down
- Light during the daylight hours
- Visual contact with other pigs
- Accommodation that neither harms nor causes undue strain, and that provides protection from the elements
- Rapid identification of vice, injury, and disease.

In addition, farmers are offered the general exhortation to “treat their animals efficiently and with consideration,” since “the well-being of the animal is closely correlated with its economic efficiency.”

Space to be furnished for pigs housed in groups should be sufficient for each to sleep, feed, and exercise, whereas pigs kept individually (in pens, stalls, or tether) should be able to stand normally, lie with limbs extended, stretch, and should have a clean, dry place. Flooring, the code states, must “minimize the risk of injury or disease and allow pigs to stand normally.” Pigs are to be fed at least once a day, and given a constant supply of water. The use of farrowing crates is held to be an acceptable practice; the only recommendation concerning them is that sows be given some time to get accustomed to the crate arrangement before the actual time of parturition arrives.

Although it is advised that the use of goading devices and surgical procedures be “minimized,” there is no specific provision forbidding them, either.

The Federation’s response, in their “Comments” piece, notes, first, that the list of “basic needs” omits any “recognition of the fact that pigs are intelligent and curious animals, with a well-recognized need for some activity.” Nor are pigs acknowledged to have a basic right to walk around a little or turn around; this latter omission, to the Federation, indicates that those who formulated the code never intended to address the actual needs of pigs, but only to legitimize current practices of intensive agriculture.

The Federation recommends, therefore, that the code needs to be changed to underwrite the pig’s fundamental right to movement and to some variety in activity. In addition, they assert, the code ought to recommend that an outside run be made available to pigs during daylight hours. They also note that, strangely, while pigs kept in groups are to be given sufficient space for exercise, “there is no mention of the needs of pigs housed individually to exercise.”

Many of the other common practices that are tacitly accepted by the code are condemned by the Federation, including tethering of animals, the use of farrowing crates that frustrate the sow’s natural nest-building instinct, goading devices, and castration. They also find the minimum space allowances suggested for pigs (1.4 sq meters per animal) to be woefully inadequate.

2. The Domestic Fowl

Virtually the same items addressed in the code for pigs are considered in the code for fowls; the list of “basic needs” for birds, for example, is an exact duplicate of that for pigs, except that the word “fowl” has been substituted for “pig.”

Flooring for birds (as for pigs) is to “minimize the risk of injury and disease and allow fowls to stand and move normally.” No specific kinds of flooring, however, are recommended or proscribed, and multi-tier cages are considered acceptable.

Lighting is allowed to be kept as dim as 2 lux, if low light is felt to be useful to control vices like feather picking. Induced moulting is also condoned, again, as with pigs, birds are to be fed at least daily (minimum trough length, 10 cm per bird) and water provided ad libitum.

Stocking density data, given in Appendix 1 of the code, are a bit tricky to interpret, since they are given in kilograms of live weight per square meter: such figures are usually expressed in square centimeters per bird. But, by way of example, the allotment stipulated for laying hens in cages, 48 kg/sq meter, works out to about 460 cm for each bird.

The Federation believes that the code for fowl needs much more specific and forthright in denouncing the cruelty of many practices currently in use. Wire floors, for instance, ought to be clearly designated as unsuitable. And the keeping of hens in cages, they believe, should be completely banned, irrespective of stocking density. A level of lighting as low as 2 lux—which is permissible according to the code—would, they argue, contradict an earlier provision set forth in the code itself, i.e., that fowl have a basic need for visual contact with each other. The Federation recommends a lighting level of at least 10 lux.

Forced moulting is another practice condemned by the Federation. They feel that it ought to be plainly stated that forced moulting is a deliberately imposed stressor, done solely for the convenience of the husbandryman. Stocking density regulations, too, are considerably off the mark. For instance, the 460-sq cm figure cited as adequate for layers in cages compares poorly with the 735 sq cm proposed by the U.K.’s Brambell Committee. The cages themselves, the Federation argues, ought to be phased out completely within a 5-year transitional period.

Other procedures permitted by the code, such as debeaking, are denounced by the Federation because they are undoubtedly severely painful. They are performed to alleviate only the symptoms of more fundamental welfare problems like overcrowding.

3. Road Transport of Livestock

4. Rail Transport of Livestock

These two sections of the code will be summarized together since, with the exception of several very minor details, the principles and particular recommendations set forth in the sections on road and rail transport are alike.

It is stated that transit of animals subjects them to stresses from a variety of sources, such as handling; unfamiliar surroundings, noises, and sensations; psy-
Legislation & Regulation

Point-Counterpoint: Draft Australian Code of Animal Welfare and Response by Australian Federation of Animal Societies

As reported previously in these pages (Int J Stud Anim Prob 3(3):250, 1982), the Australian Standing Council on Agriculture (SCA) recently concoted a draft version of a new animal welfare code, comprised of four sections:

1. The Pig
2. The Domestic Fowl
3. Road Transport of Livestock
4. Rail Transport of Livestock

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In addition, farmers are offered the general exhortation to “treat their animals efficiently and with consideration,” since “the well-being of the animal is closely correlated with its economic efficiency.” Space to be furnished for pigs housed in groups should be “sufficient for each to sleep, feed, and exercise,” whereas pigs kept individually (in pens, stalls, or tether) should be able to stand normally, lie with limbs extended, stretch, and should have a clean, dry place. “Flooring,” the code states, must “minimize the risk of injury or disease and allow pigs to stand normally.” Pigs are to be fed at least once a day, and given a constant supply of water. The use of farrowing crates is held to be an acceptable practice; the only recommendation concerning them is that sows be given some time to get accustomed to the crate arrangement before the actual time of parturition arrives.

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It is stated that transit of animals subjects them to stresses from a variety of sources, such as handling, unfamiliar surroundings, noises, and sensations; psy-
Several appendices then set forth guidelines for the stocking densities, amounts of food and water required, and special requirements of animals in transit. In some instances, it is advised that animals be transported (or penned) separately—for example, unbroken horses, young calves, or any group of animals whose constituents vary greatly in size. For adult poultry, crates or containers must be loaded sufficiently loosely that the birds have space “to stand, move and seek comfort,” but should also be packed densely enough that bruising during transport is prevented. Fowls should not be held in shipping containers for more than 24 hours unless they are given food and water.

The Federation’s “Comments” heartily endorses the proposed regulation that one person be clearly designated as responsible for animals in shipment, at every point in the journey, and further suggests that a document accompanying each consignment of animals list the person in charge for each phase of transit. However, they take strong objection to the statement that only pigs require shelter from excesses in temperature. Indeed, they recommend that other species, too, be furnished shade whenever the temperature exceed about 30°C. The use of electric prods, the Federation believes, must be totally eliminated, not merely used as little as possible, since “these implements are very liable to abuse when temps become frayed.”

The allowable periods of transit seem to the Federation to be too long—"if journeys of many days are required, they contend, the best solution may lie simply in establishing more local abattoirs. Maximum permissible transit times proposed by the Federation are:

- For immature ruminants and monogastric animals—18 hours, with 24 hours’ rest before the next stage of travel
- For mature ruminants—18 hours, extendable to 24 hours if 24 hours’ rest is provided
- Animals transported singly or in small groups should be allowed to get out of the container and exercise every 24 hours

Finally, the Federation is concerned about the section in Appendix 3 that would allow fowl to be kept in containers or crates for more than 24 hours, as long as food and water are offered. Since the animals in these crates are so severely constructed, the Federation holds, they ought never to be held in these containers for longer than 24 hours, under any circumstances.

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The allowable periods of transit seem to the Federation to be too long—48 hours without further rest. During loading and unloading operations, no animals should be lifted off the ground at any time, and experienced stockmen must supervise both loading and unloading operations.

For every 24 hours of travel time, a rest period of 12 to 24 hours must be provided to immature ruminants and all monogastric animals like horses and pigs. If a full 24-hour rest period is included, the code states that these animals may travel for as long as 36 additional hours without further rest. In the instance of mature ruminants, the transit time after a 24-hour rest may be extended to 48 hours.

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### Current Events

**MEETING REPORTS**

**Conference on Rabies: The U.S. Mid-Atlantic Outbreak**

The January 13, 1983 issue of New Scientist reported that in Europe, successful control of rabies in wildlife may soon become a reality. Rabies first appeared in Poland in 1947; since that time, it has been moving steadily westward, transmitted chiefly among foxes, at a rate of about 30 miles a year. In an attempt to stop its further expansion, Swiss veterinarians have developed a vaccine that is made up of attenuated noninfectious (but nevertheless live) virus; the vaccine was given to the foxes via chicken head baits. For this program, the initial results have been propitious. Although there remains a very remote possibility that the immunization virus might revert back to a virulent form, thereby causing a disastrous increase in the incidence of the disease, the benefits to date from the Swiss program have been tremendous: the further spread of rabies to the Upper Rhone Valley seems to have been halted.

In the U.S., however, there persists a certain wariness about the potential danger of massive deployment of live-virus vaccine. Also, in contrast with Europe, the principal vector of rabies here is the raccoon, an animal that shows distinctly different patterns of rabies occurrence and transmission than the foxes of Europe. Rabies is endemic in many species of U.S. wildlife, but in the last few years, the mid-Atlantic area has experienced what appears to be an epidemic of rabies in raccoons. To sort out the facts from the myths about the outbreak, a conference was held on the topic at the Laurel Ridge Conservation Education Center in Vienna, VA.

The first speaker, Suzanne Jenkins from the Centers for Disease Control, provided the conference with a brief history of the outbreak, and some pertinent data on the epidemiology of rabies in several common species. The earliest known description of rabies dates back to 500 B.C., in Greek mythology. Throughout most of history, raccoons have been found predominantly in dogs but, in 1953, the introduction of an effective rabies vaccine for dogs initiated a rapid decline in the incidence of the disease in the canid population (about 5,000 cases in dogs were reported in 1953; by 1983, the number had dropped to 185). Then, however, in 1978, public health officials began to observe a real spike in the incidence of raccoons in both wild and domestic animals.

In foxes, the disease is cyclical, but the overall incidence remains at a low level. Only in New England is fox-to-fox transmission suspected; other cases in foxes are probably caused by "spillover" from skunks. Cases in skunks approximate 4,000 a year, and these animals may thus be responsible for some spillover of rabies to other species occupying the same or adjacent territories. The pattern of geographic distribution of rabies in skunks, raccoons, and dogs do seem to coincide, thereby substantiating the concept of spillover among species. And, while skunks appear to be somewhat more resistant to rabies infection than some other species, they show severe symptoms when they contract it and, more important, excrete more contagious virus particles before they succumb. Rabies in bats doesn't show any obvious geographic clustering; isolated cases, probably not associated
with raccoons and human populations. Since the raccoon populations are much lower, and partly because people there are more likely simply to kill and bury a suspected rabid animal, report their suspicions to local authorities.

Factors in the current outbreak include a possible recent overpopulation among raccoons, but Dr. Jenkins admit
ted that we really have no reliable data on the raccoon populations or their movements. The only means of controlling the extent of transmission of rabies to humans available in the U.S. are (1) creating physical barriers between ourselves and wild animals; (2) inoculation of animals; and (3) determining raccoons from living so closely with us, by removing possible food sources like garbage.

Some have requested that we try to halt the outbreak by killing off the entire raccoon population. But, even if this were somehow construed to be the method of choice, "population control for raccoons doesn't seem to work," Dr. Jenkins noted. If their numbers are greatly decreased, raccoons display a rebound phenomenon, and utilize an increased reproductive capacity to compensate for recent losses. She did suggest trapping in isolated cases, as a means of eliminating suspected rabid populations. But this practice is of limited utility because, first, wholesale trapping may result in the removal of immune animals (which are then replaced by new, susceptible occupants) and, second, translocated raccoons have low survival rates. This means, Dr. Jenkins concluded, that any trapped raccoons must be destroyed.

While a live vaccine for raccoons in wild life is available, there is still great fear among those at CDC concerning the havoc that could be created if the attenuated virus in the vaccine were to revert to its virulent form. Small-scale testing of the vaccine is about to begin, though in Washington, East Rock Creek Park. Dr. Jenkins did recommend human vaccination for all those in high-risk jobs.

David Manski from the U.S. Park Service spoke next about his proposed studies on the raccoons of Rock Creek Park, a long strip of land that runs right through the center of urban Washington. He had discovered that there were virtually no data on the ecology of urban raccoons. He therefore plans to study the park's raccoons intensively over the next 12 months. The principal objectives of the study are to:

- Establish raccoon densities and their distribution in the park
- Describe the age/sex/social structure and survival patterns
- Quantify raccoon movements and resource utilization in the park and adjacent residential and commercial areas
- Monitor the raccoon population for rabies
- Evaluate the efficacy of vaccinating the park raccoons against rabies

In the wild, he said, population densities are estimated at 20 sq km for coastal areas and marshes (the animals' prime habitat), or as low as 1 sq km (in less favorable sites like prairies). These numbers contrast dramatically with urban densities, which average 68 sq km. The movements of raccoons in the wild are related to their quest for food sources, usually fleshy fruits. In cities, however, the range and frequency of movements may differ radically, since the new food source, garbage, is always close at hand. In the upcoming Rock Creek study, animals will be trapped, and every raccoon so captured will be marked for identification. Blood samples, to test for rabies antibody titers, will be taken. Animals will then be vaccinated and later retrapped, to take follow-up blood samples.

Jeffrey Lake, of the Virginia State Department of Health, has already used a somewhat different approach to investigate the ecology of raccoons in northern Virginia. His study will:

- Monitor the raccoons cases reported in the state
- Characterize the location of each case according to a list of 40 geographic and environmental factors
- Define the factors that affect any change in the distribution of rabies
- Provide data for later evaluation of the relative effectiveness of different control tactics, including oral vaccination.

For the purposes of the study, Mr. Lake has divided the state into 6,000 grids of 1 sq km. Each of these areas is described in terms of factors like slope, aspect, use, and distance to a stream or bridge. Distance to a residential area, rainfall, and distance from other reported cases. Among other things, he is trying to find precise figures on the rate at which rabies is spreading in the state. He also plans to use the CDC data to indicate that rabies travels somewhere between 25 and 50 miles per year.

Mr. Lake has already discovered one important datum: if a small food area is established, about 80 to 90 percent of the raccoons in a large area will pass through it. He then presented his study area to the audience. This item on raccoon logistics offers hope that, should massive vaccination be attempted in the U.S., a relatively small number of vaccination sites will suffice to immunize a large proportion of the raccoon population.

Sylvia Simpson from the Maryland Health Department discussed some of the cost-vs-benefit factors entailed in rabies control. For three Maryland counties, she itemized, and then obtained cost data for, various kinds of activities potentially useful for controlling raccoons and informing the public about it. These activities included media campaigns (TV and radio spots, flyers, newspaper articles), stepped-up efforts at vaccinating dogs and cats, data on the cost of vaccines, and the amount of time spent by personnel like public health department workers who could have been used on other programs.

She found that, by 1983, in the three study counties one-tenth of the cats, one-half of the puppies, and two-thirds of all adult dogs had been vaccinated. In her opinion, a reasonable immunization goal should be set at one-half of the cats and three-fourths of the adult dogs. Alternatively, the money might be concentrated on immunization of high-risk humans (such as trappers and hunters), or direct control of the size of the raccoon population.

A panel discussion among public health officials and wildlife workers then addressed the question of how best to inform the public and get companion animals vaccinated, without raising undue alarm about rabies. A variety of media programs (including a puppet show on raccoons) was described, as well as the numbers and sites of extra vaccination clinics were detailed.

However, Martha Armstrong, of the Arlington Animal Rescue League, raised some critical questions about the current approach to rabies control in the U.S. Since the epidemiology of rabies has been under the jurisdiction of the CDC, the disease is studied principally as it affects the human population; animals are only considered to the extent that they serve as a vector for transmission of the disease to humans. One consequence of this policy, Ms. Armstrong noted, is that every animal caught, whether actually infected with rabies or not, must be killed and tissue samples submitted for testing.
with rabies in other species, are reported from time to time. Rabbits and rodents are very resistant to rabies. Even when they are experimentally infected with rabies virus, they don't produce enough virus to transmit the illness to humans. Rabbits and rodents, when infected, don't always exhibit the signs of rabies or die from the disease. Right after an outbreak among raccoons, 40 to 50 percent will show antibody to rabies virus in their blood. But even 1½ years after an outbreak has subsided, a small percentage will have rabies antibody in their blood. So it is likely that a residual pool of rabies virus is always present in this species.

Until recently, most of the raccoon rabies cases reported in the U.S. occurred in the Deep South, principally in Florida, Georgia, and South Carolina. By 1981, though, rabies had traveled north to Virginia and Maryland, where far greater numbers of cases were reported than were ever observed in the South. In 1982, rabies had even crept up into Pennsylvania, although the number of cases was still relatively low. Translocation of rabies, Dr. Jenkins hypothesized, was probably caused by the transport of rabid raccoons (by individuals like hunters) back to the North.

In western Virginia, however, the pattern has been somewhat distinct: the numbers of rabies cases have remained low, partly because both raccoon and human populations are much lower, and partly because people there are more likely simply to kill and bury a suspected rabid animal than to report their suspicions to local authorities.

Factors in the current outbreak include a possible recent overpopulation among raccoons, but Dr. Jenkins admitted that he really have no reliable data on the raccoon populations or their movements. The only means of controlling the extent of transmission of rabies to humans available in the U.S. are (1) creating physical barriers between ourselves and wild animals; (2) inoculation of animals; and (3) determining raccoons from living so closely with us, by removing possible food sources like garbage. Some have requested that we try to halt the outbreak by killing off the entire raccoon population. But, even if this were somehow construed to be the method of choice, "population control for raccoons doesn't seem to work," Dr. Jenkins noted. If their numbers are greatly decreased, raccoons display a rebound phenomenon, and utilize an increased reproductive capacity to compensate for recent losses. She did suggest trapping in isolated cases, as a means of eliminating suspected rabid populations. But this practice is limited utility because, first, wholesale trapping may well result in the removal of immune animals (which are then replaced by new, susceptible occupants) and, second, translocated raccoons have low survival rates. This means, Dr. Jenkins concluded, that any trapped raccoons must be destroyed.

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3. Define the factors that affect any change in the distribution of rabies
4. Provide data for later evaluation of the relative effectiveness of different control tactics, including oral vaccination

For the purposes of the study, Mr. Lake has divided the state into 6,000 grids of 1 sq km. Each of these areas is described in terms of factors like slope, aspect, vegetation use, etc., and the annual change in the distribution of rabies is also described. The third of all adult dogs had been vaccinated, raising undue alarm about raccoons. A variety of media programs (including a puppet show on raccoons) was described, and the numbers and sites of extra vaccination clinics were detailed.

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If the verdict from the test lab comes back negative for rabies, it is small comfort to the dead animal, or to the animal welfare worker who was compelled to euthanize it. She wondered if one untended result of current campaigns might therefore be the massive destruction of raccoons. And Ms. Manski asked whether large-scale vaccination of raccoons might have the adverse effect of removing raccoons as a natural self-regulator of animal populations. He also questioned whether animals artificially immunized by humans could still be considered wild, in the true sense of the word.

In sum, the conference provided a thorough background on what is known about the methods of rabies control currently available in the U.S. But no notion that some aspects of these methods might be inhumane, or that the mind-set of the whole approach might be a typical product of the manipulative "game management" perspective on the nature of human interaction with wildlife, emerged only in the unanswered questions that were voiced, merely as footnotes, at the very end of the session.

**FORTHCOMING MEETINGS**

**University of California, Davis:** Conference on Animal Stress, July 6-8, 1983, Sacramento, CA. Various aspects of recent research on indicators and consequences of stress in animals will be discussed. Contact Barbara Adams, Dean's Office, College of Agricultural and Environmental Sciences, University of California, Davis, CA 95616.

**University of Surrey:** "Short Course in Laboratory Animal Science and Technology," July 25-September 2, 1983, University of Surrey, Guildford, Surrey, U.K. This high-literacy and high-impact course is designed for people with some experience in this field but who hold, or will in the future, major responsibilities for the management and organization of units that serve education, industrial, or governmental laboratories.

**International Council for Laboratory Animal Science:** "The Contribution of Laboratory Animals to the Welfare of Man and Animals: Past, Present, and Future," July 30-August 5, 1983, Vancouver, B.C., Canada. Topics covered will include: a geographic overview of laboratory animal science; the animal model in gerontological studies; the development, status, and future of international quality in laboratory animals; standardization; and new and future trends in biotechnology. Contact Dr. M. Jol, ICLACALAS 1983, Box 286, 810 West Broadway, Vancouver, BC, Canada V6B 1J8.

**American Society of Primatologists:** 5th Annual Meeting, August 7-10, 1983, East Lansing, MI. Contact Dr. David M. Taub, c/o Yenasse Primate Center, 414 New Street, Beaufort, SC 29029.

**Austrian Ludwig Wittgenstein Society:** 6th International Wittgenstein Symposium, August 15-21, 1983, Kirchberg/Wechsel, Austria. The theme of this year's symposium is "Aesthetics—Philosophy of Religion," and papers are now being solicited in the following subject areas: Wittgenstein, recent developments in aesthetics, methods in aesthetics and in philosophy of religion, knowledge and belief, science and religion. Contact Dr. A. Hän­ner, President, Austrian Wittgenstein Society, Markt 234, A-2880 Kirchberg am Wechsel, Austria, or Professor Werner Leinfeller, University of Nebraska, Dept. of Philosophy, Lincoln, NE 68508.

**World Veterinary Association:** XXII World Veterinary Congress, August 21-27, 1983, Perth, Western Australia. Planned session topics include: "The Place of Animal Production in Veterinary Science," "The Role of International Organizations in the Field of Animal Health," and the Recognition of the Emerging Role of Companion Animals in Human Health." Papers to be presented will focus on avian medicine, epidemiology, small animal medicine, veterinary education, and veterinary state medicine, among others. Contact WVC Travel Planners, P.O. Box 32366, San Antonio, TX 78216.

**International Union of Toxicology:** Third International Congress on Toxicology, August 28-September 3, 1983, San Diego, CA. This congress provides a forum for international communication of toxicological endeavors and promotes worldwide cooperation in identifying and addressing issues in the field of toxicology. Symposiums tentatively planned for the meeting include: "Toxicology of Energy Sources from Synthetic Fuels," "Behavioral Toxicology: Link Between Chemical Lesions and Functional Deficiencies," and "Recent Approaches to the Problems of Dose-Response of Genotoxic Carcinogenicity." Contact J. Wesley Clayton, Ph.D., Department of Pharmacology & Toxicology, College of Pharmacy, University of Arizona, Tucson, AZ 85721.


**IEMT:** International Symposium on Pets and Society on the 80th Birthday of Prof­essor Konrad Lorenz, October 17-19, 1983, Vienna, Austria. Contact Secretary, IEMT, Johann-Bloßnner Gasse 2, A 1120, Vienna, Austria.

**Society of Environmental Toxicology and Chemistry:** 4th Annual Meeting, November 6-9, 1983, Arlington, VA. The theme of this year's meeting will be: Multi-disciplinary Approaches to Environmental Problems, and will cover sub­lethal effects, complex mixtures, risk analysis, regulatory and legal aspects, agro­ecosystems and pesticides, effects on communities and ecosystems, and innovative experimental and statistical methods. Contact Barbara T. Walton, Program Chair, Environmental Sciences Division, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830.

**International Association Against Painful Experiments on Animals and the American Fund for Alternatives to Animal Research:** Conference on religious perspectives on the use of animals, July 1984, London, U.K. Papers to be presented will deal with aspects of the scientific use of animals, in educational settings, toxicity testing, and basic and applied research. Contact Professor Tom Regan, Department of Philosophy and Religion, North Carolina State University, Box 5688, Raleigh, NC 27650.
If the verdict from the test lab comes back negative for rabies, it is small comfort to the dead animal, or to the animal welfare worker who was compelled to euthanize it. She wondered if one un­ tended result of current campaigns might therefore be the massive destruction of raccoons. And Mr. Manski asked whether large-scale vaccination of raccoons might have the adverse effect of removing rabies as a natural self-regulator of animal populations. He also questioned whether animals artificially immunized by humans could still be considered wild, in the true sense of the word.

In sum, the conference provided a thorough background on what is known about the methods of rabies control currently available in the U.S. But any notion that some aspects of these methods might be inhumane, or that the mind-set is still that of the whole approach might be a typical product of the manipulative “game management” perspective on the nature of human interaction with wildlife, emerged only in the unanswered questions that were raised, merely as footnotes, at the very end of the session.

International Council for Laboratory Animal Science: “The Contribution of Laboratory Animals to the Welfare of Man and Animals: Past, Present, and Future.” July 30-August 5, 1983, Vancouver, B.C. This meeting, which will be held in conjunction with the Annual General Meeting of the Canadian Federation for the Protection of Animals, will seek to draw up a listing of clearly defined goals for the animal rights movement, as related to the specific issues of intensive farming, vivisection, and fur production. Contact LifeSource, Box 3117, Main Post Office, Vancouver, B.C., Canada, V6B 3X6.

Wittgenstein, recent developments in aesthetics, methods in aesthetics and in philosophy of religion, knowledge and belief, science and religion. Contact Dr. A. Hübner, President, Austrian Wittgenstein Society, Markt 234, A-2880 Kirchberg am Wechsel, Austria, or Professor Werner Leinfeller, University of Nebraska, Dept. of Philosophy, Lincoln, NE 68508.

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Australian Society for the Study of Animal Behavior and the Australian Academy of Sciences: 18th International Ethological Conference, August 29-September 6, 1983, Brisbane, Australia. Plenary sessions will be strongly didactic, but will also provide a general overview of recent developments and highlight any problems or controversies. Contact Conference Sec-

FORTHCOMING MEETINGS

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Topics to be covered include animal health, care, nutrition, and experimental usage, along with management and staff training. After the 2-week lecture course, attendees will be given the option of an additional 2-weeks of work experience in a major British laboratory facility from September 5-16, 1983. Contact Mr. A.A. Tuffery, Department of Biological Sciences, North East Surrey College of Technology, Reigate Road, Ewell, Surrey KT17 3DS, U.K.

Lifeforce: Animal Rights — A Humane Symposium, July 30-August 5, 1983, Vancouver, B.C. This meeting, which will be held in conjunction with the Annual General Meeting of the Canadian Federation for the Protection of Animals, will seek to draw up a listing of clearly defined goals for the animal rights movement, as related to the specific issues of intensive farming, vivisection, and fur production. Contact LifeSource, Box 3117, Main Post Office, Vancouver, B.C., Canada, V6B 3X6.


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Buddhists Form Animal Organization

Buddhists Concerned for Animals, Inc. (330 Page Street, San Francisco, CA 94102) is a new organization for those "who see consideration of animals, and responsiveness to their suffering, as an integral part of Buddhist practice." The concerns of BCA about the current misuse of animals spring from the belief that all living beings are, alike, manifestations of the life-force of Buddha, and all share a common experiential base as well—pain, grief, sorrow, hunger, and thirst.

One of their first efforts is a quarterly newsletter. In the Winter 82-83 issue, they set forth the grounding and motivation for their beliefs, and then detail current positions on animal issues: they have come out strongly against factory farming, animal experimentation, and trapping with leghold traps. A longer article relates the role of animals in war-related research, thus providing yet another rationale for supporting a nuclear freeze.

BVA Trust Funds Animal Welfare Chair

Substantial funding for a chaired professional position at one of the U.K.'s veterinary schools has been announced by the British Veterinary Association's president, Neal King. The person who will provide the bequest will reserve the privilege of nominating her choice as the veterinary school that will sponsor the post but, should her initial offer meet with any complications, the BVA Trust does not intend to delay the appointment, and will simply offer the post at another university.

Toxicology Directory

A "Directory of Toxicology Testing and Consulting Institutions in the U.S."

Get Out Your Pencils and Paper—Animal Welfare Journalism Contest

The Scientists Center for Animal Welfare is inviting all those who feel they have a flare for scientific writing to submit entries for its 1983 Journalism Awards. Stipends of $500 each will be awarded in four categories: articles published since 1980, and articles currently being prepared for publication.

Entries, SCAW advises, should consist of thoughtful, well-researched articles that focus on the use of animals in biomedical experimentation, scientific education, or agricultural practices. It is stressed that the development and discussion of ideas and points of view must be given primary emphasis, rather than mere presentation of data or methodology.

Each entry should be accompanied by (1) the author's name, address, home and office phone numbers, and affiliation; (2) if published, a copy of the article and the publication's title and date; (3) if unpublished, a copy of the typewritten draft of the article and a background statement discussing the development of the article; and (4) samples of previously written articles. The deadline for the contest is September 30, 1983, and it is anticipated that the awards will be made on November 1, 1983.

Send all entry materials to Marcia R. Feinleib, Executive Secretary, Scientists Center for Animal Welfare, 2115 East Jefferson Street, Suite 401, Rockville, MD 20852.

Institute for Alternative Agriculture, Inc., Established in Washington

To provide a credible and reliable resource for objective education and research on biological/organic farming, the Institute for Alternative Agriculture has been formed in Washington, DC. The Institute will promote organic farming systems, because they can help (1) reduce soil erosion and compaction; (2) conserve energy; (3) minimize agricultural pollution of streams and ground water; (4) avoid our current heavy dependence on increasingly expensive and uncertain sources of agricultural fertilizers and pesticides; (5) contribute to long-term sustainable food production; (6) enhance environmental quality for fish and wildlife; and (7) improve food quality and safety.

Those at the Institute believe that the conventional agricultural community persists in ignoring the benefits of alternative agriculture principally because of misinformation (or lack of information), or the negative image that conventional farmers may have formed of alternative farming systems. To explain the possible role of organic farming, the Institute will initiate a national information clearinghouse on all aspects of alternative agriculture; provide alternative farmers and their support industries with an educational and research organization that is strategically located in Washington; work with state and regional organic producer and marketing groups in coordinating and sharing information; reach out to conventional farmers and consumers with objective information; and publish a regular newsletter, Alternative Agriculture News. The first issue of this publication provided news and comment on agriculture-related items such as the Agricultural Research Service's long-term program plan, which calls for the development of alternative agricultural systems, but then provides no funding to implement the recommendation, and a description of the U.S. senate's Weaver bill, which would provide federal support for research and information programs on alternative agriculture—a revised version of the Organic Farming Act of 1982, narrowly defeated last August.

For more information, write to Institute for Alternative Agriculture, Inc., 9200 Edmonton Road, Suite 117, Greenbelt, MD 20770.

New Publications from the Primate Information Center

Three new bibliographies on primates have recently been printed by the Primate Information Center. The new titles are: Behavioral Observations of Feral and Free-Ranging New World Monkeys: A Bibliography (1940-1979); Behavioral Observations of Feral and Free-Ranging New World Monkeys: A Bibliography (1980-1982); and Catecholamines and Corticosteroids in Nonhuman Primates During Stress: A Bibliography. For ordering information, write to Primate Information Center, Regional Primate Research Center (51-50), University of Washington, Seattle, WA 98195.

Animal Toxicology Hotline

An Animal Toxicology Hotline service has been initiated for the U.S. at (207) 333-3611. It is available 24 hours a day, 7 days a week, and supplies information and advice about identified or suspected cases of animal intoxication with chemicals or poisons. When telephone consultation is judged insufficient in any particular case, a team of investigators will be sent out to assist the attending veterinarian in making a diagnosis and setting up a treatment regimen (note that the service is only available through primary veterinarians). There is no charge for the telephone consultation, but charges are made if an emergency team is dispatched, based on the expenses incurred and the magnitude of the problem.

Hotline personnel have access to a comprehensive data bank containing up-to-date information on chemicals, feed additives, drugs, pesticides, environmental contaminants, and plant and mold toxins likely to have affected animals through ingestion or inhalation. The data bank also includes details on comparative toxicity and recommended therapeutic and decontamination measures.
ANNOUNCEMENTS

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Scientists Center for Animal Welfare Publishes Proceedings of Conference

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Copies can be obtained for $14.50 from Academic Press, 111 Fifth Avenue, New York, NY 10003.

Felix Wankel Research Award for Animal Protection

To help establish a scientific basis for modern animal protection, the Felix Wankel Research Award for Animal Protection has been established, with awards totaling DM 50,000 given each year, to express appreciation for the work of individuals who have made an outstanding contribution to the scientific study of animal welfare. Those who wish to compete for the prize should submit papers based on their own research, which reflect knowledge gained in the course of that work and its immediate benefit to animals. Entries must be received by December 15, 1983, at the office of the Felix Wankel Research Award for Animal Protection, c/o Director H.-J. Weichert, Ortlin-destrasse 6/VIII, D-8000, Munich 81, Federal Republic of Germany. All entries, originally written in a language other than German, should also include a summary in German.

Book News

BOOKS RECEIVED

Livestock Production in Europe: Perspectives and Prospects, R.D. Politiek and J.J. Bakker, eds. Elsevier Scientific Publishing Co., New York, 1982. This book provides an excellent review of animal production in Europe and also includes predictions of probable future trends in husbandry and marketing practices. Chapters written collaboratively by multiple authors review animal disease control, economic and structural developments in livestock, poultry, horse (for meat), wild game, rabbit, and fox and mink (for fur) production. A short, but useful, review of animal welfare is given, one noteworthy point being that the tethering of sows is now banned in Sweden and Switzerland and that battery cages for pigs are outlawed in Switzerland. References to consumer and environmental health hazards created by "chemical" farming, animal medications, etc., provide added depth and relevance to this publication. — M.W. Fox

Health Hazards from Pigeons, Starlings, and English Sparrows, Walter J. Weber (Thomson Publications, Fresno, CA, 1979). For Weber, the great flocks of sparrows and other birds that inhabit so many of our cities can only be termed "pests," because they are messy, noisy and, in some instances, transmit diseases to humans, either directly or via associated insect vectors (such as mosquitoes). This book, then, represents a scientific compilation of the available data on these diseases, with particular attention given to the lesser-known kinds of infections. But it is difficult to resist the impression that Weber, though claiming to be an enthusiastic member of the Audubon Society, has something of a phobia about birds, or at least about the three species covered in the text. In language that could stand as a somber epilogue to Alfred Hitchcock's film "The Birds," Weber warns us in his introduction: "The pest birds never quit, and neither must we. We must stay ahead of the pest birds at all times or at least reduce the inroads of their destruction." As a logical consequence of this kind of them-or-us attitude, Weber advocates several methods of bird population control that are of dubious humanity, such as toxic perches, shooting, and strychnine-treated baits.

Diseases Transmitted by Rats and Mice, Walter J. Weber (Thomson Publications, Fresno, CA, 1982). The broad spectrum of diseases that are commonly carried on rodent vectors and are often transmitted from these species to humans is detailed in this brief (168-page) volume. For each type of infection, the precise etiology and associated health hazards are listed (including typical symptoms). The behavior of rats and mice that live near and among human habitats is discussed, and several species that are endemic in some regions of North America are described. The glossary of technical terms that is appended to the book helps to make the information presented more accessible to the layman.

Book Reviews

BEHAVIORAL ENRICHMENT IN THE ZOO, Hal Markowitz (Van Nostrand Reinhold, New York, 1982). The way a society treats its animals often reflects its moral character, and the history of zoo management closely parallels the evolution of Western attitudes about wildlife and nature. The Romans were the first to capture and cage exotic species on a massive scale. However, the citizens of Rome apparently had a taste for the cruel and unusual, as many animals were tortured and killed to satisfy the public's need for "entertainment." Remarkably, it has taken our civilization some 2,000 years to begin to accept the notion that nonhuman animals should be treated with understanding and respect. Even modern zoo managers have been criticized for subordinating the needs of animals to the arbitrary and often petty whims of people. In Behavioral Enrichment in the Zoo, Hal Markowitz makes a novel attempt to address this issue.

Markowitz is a psychologist, and the main premise of his book is that modern zoos still fail to provide adequate "behavioral opportunities" for their animals. Typically, a visit to the local zoo is sufficient to demonstrate the truth of this statement. Traditional zoo cages are often relatively small and sterile, thus providing little opportunity for animals to exhibit their full range of species-typical behavior. To solve this problem, the author suggests that zoo designers plan and build more "naturalistic" displays that "provide microcosms of the animal's native home." To the layman, this may seem a fresh and revolutionary idea, but numerous zoo professionals and biologists have argued before for a more naturalistic approach to the zoo design. The real novelty of Markowitz's approach lies in his use and advocacy of computer technology and operant conditioning techniques to increase "behavioral opportunities" for zoo animals. Proponents of this approach have coined the terms "behavioral engineering" and "behavioral enrichment."

Behavioral engineering has its roots in the area of experimental psychology known as animal learning. Unfortunately, the author provides little background information on learning and makes no real effort to familiarize the reader with the jargon used by learning psychologists.

Operant conditioning is a form of learning that has become almost synonymous with the name of B.F. Skinner. The basic principle behind Skinnerian theory is that a behavior which is rewarded (reinforced) will tend to be repeated, while a behavior that is punished will tend to disappear from the animal's repertoire. The process of behavioral "shaping" may occur when an animal is rewarded for successive approximations to some desired behavior. The same techniques are used to train animals to perform complicated stunts for carnival and circus acts.

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A major weakness of Markowitz's book is that it virtually ignores the important contributions of ethology, behavioral ecology, and sociobiology to cap­tive animal management. Indeed, behavioral engineers usually focus on increasing the frequency of two very specialized activities: feeding and locomotion. Other behaviors, such as those involved in reproduction, communication, parental care, and aggression are largely ignored, and the degree to which these behaviors may be affected by the training procedures is also neglected. Moreover, there is a danger that an overemphasis on learning may lead to a neglect of the genetic factors involved in animal behavior. Many behavioral traits in animals are under a high degree of genetic control. Such species-typical behaviors do not have to be learned; they simply appear in the animal's repertoire the first time it encounters the appropriate environmental stimulus.

The most disturbing aspect of Markowitz's book is his description of "educational" exhibits, which attempt to promote interaction between zoo animals and people (Chapters 8 and 11). In one case, visitors are encouraged to play a computerized game of "tic-tac-toe" with an orangutan. In another, visitors may elicit predatory behavior in otters by pressing a button. (People are able to control the release of live crickets on which the otters can feed.) Markowitz takes great care to distinguish these game-oriented displays from carnival acts by noting that "the animals are "free to choose" whether or not to participate. Nevertheless, such displays do in fact have at least one thing in common with carnivals and circuses, in that they both subconsciously perpetuate the notion that nonhuman animals exist to serve as entertainment. The importance of this point is evident when we consider the subtle relationship that exists between experience and attitude formation. We have destroyed great parts of this planet because we have lost respect for nature, and if we continue to ignore the importance of this relationship, we will need to create an enlightened, aware and sympathetic public that has learned to respect animals in their own right. My greatest concern is that zoos may not be able to create these attitudes in the public mind if they depict animals as nothing more than complex machines that can be molded and manipulated for human pleasure. The idea that zoos could become "living video games" where visitors can elicit animal behavior on demand is a disconcerting one.

in the Zoo should be read with skepticism. The book is generally well written and does make some interesting points. However, the potential of behavioral engineering to solve the behavioral problems of captive animals is greatly limited, and it should not be presented as a general panacea. To improve behavioral opportunities for zoo animals, we must first stop exhibiting arboreal species in enclosures more suitable for terrestrial ones; stop exhibiting social species in abnormal groupings; and stop expecting animals to exhibit relatively natural patterns of behavior in artificial environments that do not even provide the simplest and most essential of naturalistic stimuli.

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GORILLA BEHAVIOR. Terry L. Maple and Michael P. Hoff (Van Nostrand Reinhold Co., New York, 1982, $32.00). The authors' stated goal in this book is to blend knowledge of gorillas from both field and captivity into a reference work. They are especially concerned about the welfare of great apes in laboratories and zoological parks. That a need exists for such information is clear in the book: Over 80 percent of infants born alive in captivity are taken from their mothers, to be reared artificially. Of 57 adult male gorillas found in American zoos, fewer than 15 fathered offspring. Worldwide, about 400 captive gorillas are spread thinly over about 130 institutions. The number of such institutions that keep gorillas in naturalistic groups is only a handful. The problems exist—do the authors provide answers? Yes, and no. Their coverage is wide, with chapters on such topics as expression and emotion, sexual behavior, birth and parental behavior, intellect, etc. They report hitherto unpublished findings on humane practices, e.g., conditioning of cooperation from gorillas in physical checkups, through de

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Computers and motor-driven conveyor belts ensure that animals are automatically rewarded when they exhibit the desired behavioral response.

Markowitz devotes a major portion of his book to describing the application of operant conditioning techniques to the design of zoo exhibits. For example, in Chapter 4, the author relates his efforts to train a group of diana monkeys at the Portland Zoo. In this case, the animals learned to exchange “Texas poker chips” for food by depositing the chips in a slot. Additional chapters focus on a wide variety of animals, including gibbons, harbor seals, spider monkeys, polar bears, elephants, mandrills, orangutans, otters, and tigers. Although the author does make some attempt to describe the natural history of these animals, his characterizations of animal behavior are often anthropomorphic.

Markowitz provides numerous examples in which the activity levels and health of zoo animals were presumably improved as a result of behavioral engineering. But readers should be aware that this topic is controversial, and that only a handful of zoos are currently using his techniques.

Any attempt to improve the life of animals in traditional zoo environments should be applauded, and the claim that behavioral engineering can transform a bored, inactive animal into an active, healthy and happy creature therefore has obvious attractions. Nevertheless, Markowitz has failed to confront the question of why such conditions should be allowed to exist in the first place. The application of behavioral engineering to zoo design appears to be a case of treating the symptoms rather than the disease. I cannot help but think that behavioral engineering would be largely unnecessary if zoo managers displayed animals in appropriate social groupings, and if architects designed exhibits to comport with the anatomy and behavioral specializations of particular species.

Newly constructed exhibits at the Woodland Park Zoological Gardens, Seattle, Point Defiance Zoo, Tacoma, and San Diego Wild Animal Park are prime examples of the trend toward naturalism in zoo design. Animals living in these large, environmentally complex displays have an increased opportunity to exhibit a variety of natural behaviors, without the use of operant conditioning. Markowitz claims that his approach is relatively inexpensive, and therefore should be employed when zoos cannot afford to build impressive new exhibits. However, with a little imagination and some knowledge of an animal’s natural behavior, zoo managers can improve existing, traditional cages by very simple and inexpensive means. For example, primate cages can be improved by adding a cover of hay on the floor and scattering sunflower seeds. As a result, the animals spend a considerable amount of time engaged in activities that are nearly identical to their natural foraging behavior. Similarly, natural modes of locomotion can be encouraged by adding a large number of tree branches, especially for the more arboreal species.

Despite its apparent limitations, one cannot argue that operant conditioning will have no place in the modern zoo. It is possible that behavioral engineering will become increasingly compatible with naturalistic approaches to zoo management and design. For example, Markowitz points out that carnivorous animals have little opportunity to exhibit natural feeding behavior in zoos. Offering live prey to captive carnivores may be the best solution to this problem, but some people might find this offensive. As an interim solution, Markowitz and others have designed exhibits where large cats, such as tigers, can capture live and “killed” automated prey. These techniques probably do provide some stimulation for captive carnivores, and if the apparatus is appropriately disguised, it can give the impression of natural hunting behavior.

A major weakness of Markowitz’s book is that it virtually ignores the important contributions of ethology, behavioral ecology, and sociobiology to captive animal management. Indeed, behavioral engineers usually focus on increasing the frequency of two very specialized activities: feeding and locomotion. Other behaviors, such as those involved in reproduction, communication, parental care, and aggression are largely ignored, and the degree to which these behaviors may be affected by the training procedures is also neglected. Moreover, there is a danger that an overemphasis on learning may lead to a neglect of the genetic factors involved in animal behavior. Many behavioral traits in animals are under a high degree of genetic control. Such species-typical behaviors do not have to be learned; they simply appear in the animal’s repertoire the first time it encounters the appropriate environmental stimulus.

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In summary Behavioral Enrichment in the Zoo should be read with skepticism. The book is generally well written and does make some interesting points. However, the potential of behavioral engineering to solve the behavioral problems of captive animals is severely limited, and it should not be presented as a general panacea. To improve behavioral opportunities for zoo animals, we must first stop exhibiting arboreal species in enclosures more suitable for terrestrial ones; stop exhibiting social species in abnormal groupings; and stop expecting animals to exhibit relatively natural patterns of behavior in artificial environments that do not even provide the simplest and most essential of naturalistic stimuli.

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sensitization and food reward. This presumably allows stress-free and regular monitoring of health. They give practical information, e.g., detailed plans for innovative housing for apes, including minute as to where to buy a device to carry about a young ape being hand-reared. The list of reference numbers almost 300, making it perhaps the most complete and up-to-date in print.

There are limitations, however. The two main ones are forced upon the authors by circumstances: One is that studies in captivity, for the reasons cited above, almost always have few subjects. Key papers are based on two or three gorillas, and so individual differences make any generalizations almost impossible. The other is that the vast bulk of knowledge about the behavior of wild gorillas comes from a small, isolated population living on the edge of the species's range at high altitudes, i.e., the highland gorillas of the Virunga Volcanoes. The other 99 percent of wild gorillas live in lowland forests and have yet to be studied in detail. Unfortunately, from this viewpoint, it is the latter form that is found in captivity. Other limitations are self-imposed: The book is largely based on American institutions, although according to one of the authors' tables, only 50 of the 134 places holding gorillas are in the U.S. This means, e.g., that Howletts in Kent, England, which probably has the most successful colony of gorillas in the world, is ignored.

The book's style is also problematical. Much of it reads like an extended review written by undergraduates: text liberally larded with quotations, footnotes on nearly every other page, stilted language. Were this a matter of the odd word or phrase, e.g., "the feral situation" or "flying fecal projectiles" or "thrown dung," this might be thought quibbling. However, consider this sentence which rounds off the chapter on intellect: "Gorillas are the most intelligent of the nonhuman primates, even if we must grant that they share this distinction." (p. 225) The content is debatable, the form is illogical, and the meaning is obscure. Moreover, there are whole paragraphs of jargon:

Postnatal maternal behavior seems to progress from the early licking of the newborn to more advanced contact such as pushing or pulling the infant along the ground, picking it up and holding it out for visual inspection, and dorso-ventral contact. This progression culminates in appropriate ventro-ventral contact and prolonged suckling. It is the coordination of maternal positioning of the infant on the ventrum in response to reflexive grasping and vocalizing by the infant that results in nursing. (p. 142)

The latter was so offputting that this reviewer took it as a challenge to render it into plain English:

After birth, the mother first licks the newborn, then she handles it in various ways, e.g., pushing or pulling it along the ground, picking it up and holding it out to be looked at, or hugging it to her belly, with its face outwards. Finally, belly-to-belly contact and successful feeding at the breast follow. Suckling results from the mother's putting the infant to her belly in response to its grasping and calling.

Lest this complaint seem merely pedantic, try to put yourself in the place of someone seeking a specific piece of information about gorillas. The table of contents gives only chapter titles, so one must turn to the indices. The subject index lists no proper nouns, so, e.g., Cincinnati Zoo's "love diet," which may be responsible for that institution's remarkable breeding success, or Hal Markowitz, inventor of ingenious devices for relieving boredom in captive primates, is not listed, though they are discussed in the text. Even when found, important topics are apt to be treated briefly, e.g., demography in captivity rates less than a page (p. 229), while studies of sign language in gorillas get much more attention (pp. 216-221). Regrettably, omissions, especially for a reference work, include such things as a comprehensive ethogram for the species, e.g., aggression is discussed but not submission; a listing of films on gorillas, e.g., Rumbaugh's excellent "Primary Growth and Development," and a listing of useful addresses, e.g., of the Jersey Wildlife Preservation Trust, with its prolific publishing record on gorilla husbandry and research, or of the Primate Information Center, with its literature searching skills. Each of these might have made a helpful appendix.

Inevitably, comparisons will be made with Dixon's recent book, The Natural History of the Gorilla (Weidenfeld & Nicolson, 1981) on much the same subject. Happily, the two are largely complementary, along lines suggested by their titles. Dixon is stronger than Maple and Hoff on the biology of the species, but weaker on psychology, and vice versa. Anyone who deals with gorillas should have both. Those who can afford only one book on gorillas should still buy Schaller's classic, The Mountain Gorilla (University of Chicago Press, 1963, reprinted in 1976 in paperback) at about one-third the price of the other two.

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But Are You Sure It's Better for the Calves than Confinement Crates?

(The following item is reprinted, in its entirety, from the January 1983 issue of VEALER USA.)
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Tables: These should be concise and typed double-spaced throughout.

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