NEWS and REVIEW

COMPANION ANIMALS

Boyhood Cruelty Toward Animals

Emmanuel Kant argued that cruelty to animals should be avoided, not because such behavior is intrinsically wrong, but because it might predispose the perpetrator to behave in a sadistic fashion toward human beings as well. Although there are a number of anecdotal stories supporting this position, relatively few detailed studies of the phenomenon have emerged. The studies that have been done have focused on the apparent link between animal cruelty and enuresis (bedwetting) and firesetting, rather than between animal cruelty and aggressive behavior toward other people (*Am J Psych 122*:1431, 1966; *J Psych Law* 2:45, 1974; *J Forens Sci 24*:240, 1979).

A recent paper by Dr. Alan R. Felthous (*Child Psych Hum Dev 10*:169-177, 1980) explores some of the relationships between childhood cruelty to animals and assaultive behavior directed at humans. Out of a population sample of 345 male psychiatric inpatients, 53 who fell into the most aggressive category denied repetitive cruelty to animals in childhood, while a further 18 highly aggressive individuals admitted to a history of repeated torture of dogs and cats. All but one of the 18 tortured cats, but only five tortured dogs. This disproportionately higher level of cat torture mirrors a long cultural history of persecution of cats in western societies.

As expected, most subjects in the animal cruelty group had histories compatible with a high level of aggressiveness against people. However, the animal cruelty group reported a significantly higher incidence of paternal neglect and/or abuse (either an alcoholic father or prolonged separation from the father). Other studies also indicate that the absence of a father figure is an important element in the etiology of cruel behavior toward companion animals (*Child Psych Hum Dev* 2:70, 1971), a stable father being considered influential to a boy's developing capacity to control and channel aggressive impulses.

LABORATORY ANIMALS

Scientists Evaluate Alternatives

Of the many techniques which have been put forward as possible alternatives to laboratory animals, tissue culture and computer modeling stand to the fore. Although exaggerated claims have been made for the predictive power of both techniques, their potential for investigating biological mechanisms and reducing the need to use laboratory animals is undisputed. Three papers have appeared recently in scientific journals which explore the status of these two alternatives.

The Fund for the Replacement of Animals in Medical Experiments (FRAME) published a paper by Dr. M. Tute of Pfizer Research Laboratories (*ATLA Abstracts 8* [1]:18, 1980) listing some of the ways in which computer models have been used in drug screening and in safety evaluation. One such model developed by the Genesee Computer Center, Inc. (US)

allows prediction of the oral LD50 (lethal dose for 50% of the target group) in rats for untested compounds. The proposers of the model claim that its use can materially reduce the amount of toxicological testing for new compounds and permit the drawing up of a rank order of compounds from least to most toxic (*Toxicol Appl Pharmac 41*:220, 1977). However, Tute notes that the U.K. Commission on Medicinal Chemistry is strongly discouraging the Genesee method of calculating toxicity data for the time being. Recently, 80-90% success rates were reported for the prediction of carcinogenicity by another model system (*Chem and Ind* 56, 1980), and given sufficient information in the data base, even better results should be possible. Still, Tute maintains that "...most scientists would agree that this and other predictive abilities of computer models were only in the infancy of their development as an alternative research tool."

Rees (*J Roy Soc Med 73*:261, 1980) and Smyth (*J Roy Soc Med 73*:229, 1980) discuss the contribution that cell culture can make to such fields of investigation as virology, oncology and toxicology and conclude that while cell culture has proved extremely useful in virology and in screening for anti-tumor activity, the technique suffers from a number of drawbacks in toxicology. For example, primary cell cultures which retain the biochemical characteristics of the parent tissue or organ necessitate the killing of an animal each time they are prepared. Some reduction would occur by virtue of the fact that one animal can provide cell material for a number of tests, but there is no possibility of replacement. In established cell lines, one animal can generate a virtually unlimited amount of cell material, but the cells lose some of their distinctive biochemical characteristics and thus are not as useful in investigating organ toxicity.

According to Smyth, Rees has placed the limitations and the potential of cell culture in proper perspective. He states: "...if biomedical research is to continue, animal experiments are going to be needed for a long time." However, Smyth has argued elsewhere (ALTERNATIVES TO ANIMAL EXPERIMENTS, Scolar Press, London, 1978, p. 68) that there do seem to be good prospects for developing cell culture alternatives to fairly specific toxicological problems such as the Draize eye and skin irritancy test.

Ethical Principles in Animal Experimentation

In August 1979, a group of French, Swiss, American and Canadian scientists and lawyers met at the Tufts University European Center of Talloires (France) under the auspices of the Marcel Merieux Foundation to formulate a set of principles on animal experimentation which would be acceptable to both European and Anglo-American patterns of thought and regulation. These principles have been published in two research journals (*J Med Primatol* 9:105, 1980 and *Dev Biol Standard 45*:185, 1980) and are reproduced in full below:

Principles of Ethics in Animal Experimentation

Basic Principles

Article 1: Progress in human knowledge is necessary, especially that related to biology and medicine in man and animals.

Article 2: In his quest for knowledge, man has a need to utilize animals just as he does for food and fiber and as beasts of burden; therefore he has a duty to respect animals as helpers and fellow living beings.

Article 3: Those utilizing animals in experiments must be aware of their sensitivities, capacity for memory, and capability of suffering and enduring pain.

Responsibilities of the Investigators

Article 4: The investigator is morally responsible for his actions and choices related to animal experimentation.

Article 5: Experiments involving live, vertebrate animals and the procurement of tissues from living animals for research must be performed by, or under the immediate supervision of, a qualified biological, behavioral, veterinarian or medical scientist. The housing, care and feeding of all experimental animals must be supervised by a properly qualified veterinarian or other scientist competent in such matters.

Article 6: In studies involving animals, there must be reasonable expectation that such studies will contribute significantly to knowledge which may eventually lead to the improvement of the health and welfare of either man or animals.

Article 7: Statistical analysis, mathematical models or in vitro biological systems should be used when appropriate to complement animal experiments and to reduce numbers of animals used.

Article 8: The investigator should use the animal best suited for his research, taking into special consideration the sensory and psychological development of the potentially suitable species. Endangered species, as listed in Appendix 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, should be used only when there are special, well justified circumstances. In so far as possible, animals intended for use in the laboratory should be specially bred for that purpose.

Article 9: The investigator should ensure that the animals which he utilizes are maintained and housed under optimal conditions and that they are properly cared for before, during and after experimentation.

Article 10: It is the investigator's responsibility to ensure that no animals which he utilizes suffer unnecessary pain or distress, and when this is unavoidable appropriate means are taken to limit such pain and distress.

Although activist members of the humane movement tend to view these principles as window dressing, some very influential scientists and government officials were involved in the drafting of the statements, and the fact that they considered this exercise worthy of their time and energy is a significant development in itself. American representatives included Dr. Joseph Held, Director of the National Institutes of Health Division of

Research Services, and Dr. Henry Foster, President of the Charles River Breeding Laboratories. European representatives included Dr. Frank Perkins, Chief of Biological Standards at the World Health Organization, Dr. Charles Merieux of the Merieux Foundation, and Professor M. Bertrand of the Lyon Veterinary School.

In addition to the above principles, the *Journal of Medical Primatology* (9:101-159, 1980) and the most recent volume of *Developments in Biological Standardization* (45:175-225, 1980) contain a number of articles on the humane care of experimental animals and the development and use of alternatives. Papers which may be of special interest to readers are those by Rowan on the concept of alternatives (*Dev Biol Standard 45*:175-180, 1980), by Vallier on European ideas on laboratory animal welfare (*Dev Biol Standard 45*:189-195, 1980) and by Moor-Jankowski et al. on humane methodology in a primate laboratory (*Dev Biol Standard 45*:197-202, 1980).

FARM ANIMALS

Animal Welfare and Electro—Immobilization

"Most observers, when seeing electro-immobilization for the first time, are somewhat appalled by the appearance of the tetanic animal, the interference to respiration and the stifled sounds that emanate from the paralysed larynx" (*Aust Vet Assn Newslett 6*:3, 1980). This is an excerpt from a statement on the use of electro-immobilization techniques by the Australian Veterinary Association (AVA) Standing Committee on Animal Welfare.

A study on sheep indicated that after one application of the technique, the animals showed a strong aversion to it. In one group of animals, there was a high death rate. The report states: "...there is every reason to think that for sheep, the instrument was unacceptable from the humane point of view and was doubtful from the safety aspect."

On the other hand, work at the Queensland Veterinary School and the CSIRO Division of Animal Health indicates that cattle do not show such aversion. For example, haltered dairy cattle resume eating immediately after the current has been turned off. There is no response to pain stimuli during dehorning under electro-immobilization, and cattle leave a crush quietly after such an operation in distinct contrast to the violent behavior of nonimmobilized cattle following dehorning.

Human volunteers reported a thudding sensation on application of the current, but no pain or unreasonable discomfort. The findings indicate that electro-immobilization produces some attenuation of pain sensation, presumably via a spinal gate effect, and the AVA suggests that the technique's use would seem preferable to making no attempt at analgesia during dehorning, spaying and intradermal injection.

Halothane Screening for Stress-Sensitive Pigs

When it comes to the economics of pork production, pigs exhibiting the porcine stress syndrome (PSS) have the last laugh. Their pale, soft, exudative meat, a result of rapid, stress-induced physiological changes, is responsible for major losses to the pork industry. Although stress can be reduced through careful and humane transport, handling and slaughter, it can never be eliminated. However, since PSS appears to be confined to certain types of pigs, particularly the landrace and the pietrain, the problem can also be approached from the standpoint of selective breeding.

Previous studies have established a link between genetic susceptibility to PSS and a severe reaction to the anesthetic halothane (See *Int J Stud Anim Prob 1*(3):153-154, 1980). Proceeding from this evidence and with knowledge of the probability that halothane sensitivity is carried by a single recessive gene, Dr. A.J. Webb of the Animal Breeding Research Organization (ABRO) in Edinburgh conducted halothane reaction screening tests on young pigs to investigate their possible application to reducing the frequency of PSS in affected herds (*Vet Rec 106*:410-412, 1980).

Seven week old pigs were allowed to breathe halothane in oxygen through a face mask for three minutes. Pigs who went rigid were classified as halothane positive (HP)/stress sensitive; pigs who remained relaxed or showed intermediate reactions were classified halothane negative (HN) and halothane doubtful (HD), respectively. Selection trials were then conducted in which individual breeds were divided into HP and HN lines. Trials run through a small number of generations demonstrated rapid changes in the frequency of HPs consistent with the single recessive gene argument.

Even though a correlation exists between PSS and the presence of a homozygotic halothane gene, the relationship between pale, soft, exudative (PSE) meat and halothane sensitivity is not entirely clear cut. Not all HP animals experience sudden death or yield carcasses with PSE meat. In fact, halothane reactivity is associated with a number of other production traits, both positive and negative. The carcasses of HP pigs are leaner and of higher quality; however, the reproductive performance and growth rate of HP reactors are reduced. Nevertheless, in the pietrain and Hampshire lines studied at ABRO, the negative production traits conferred by the halothane gene (increased mortality, poor litter performance) caused greater economic losses than the gains from improved carcass quality.

Given these factors, the breeder who opts for a selection program is faced with the further choice of whether to decrease the frequency of the halothane gene to cut the incidence of PSS, or increase the frequency to a point where lean content of the carcass outweighs mortality losses. It may also be possible to crossbreed susceptible and resistant lines and produce progeny which are both stress resistant and leaner than the HN parent. Although the ABRO halothane screening test can reduce the frequency of the halothane gene in only a few generations, elimination of the gene could be accomplished only with a test that could identify the heterozygote carrier as well as the double recessive homozygote responsible for the HP reaction. (For more information on stress susceptibility in pigs, see *Int J Stud Anim Prob 1*(5);324-327, 1980).

WILDLIFE

Black Rhino on Endangered Species List

The black rhinoceros (estimated total population: 14,000) is now listed as endangered by the U.S. Fish and Wildlife Service. The rhinos have been hunted intensely in sub-Saharan Africa for their horns which are exported to the Far East as medicinal charms, to India where they are used in aphrodisiac potions, and most recently, to Yemen where they are carved into decorative, status-conferring dagger handles for men.

Trade in rhino horns has become quite lucrative over the past decade; an 8 lb horn now commands approximately $2,800. The poacher who kills the animal receives about $400.

The female black rhino matures at 5 years and then gives birth to only one calf every three years. This low reproductive rate is further com-

plicated by the fact that the rhino is a solitary rather than a herd animal and thus rarely breeds in areas where the population is sparse and mates are difficult to find.

Foot-Snare Vs. Leg-Hold Traps

The Ontario (Canada) Ministry of Natural Resources has been engaged in research to improve animal traps and trapping methods since 1972. Initial studies showed that live traps are more economical and more selective than quick-kill traps. However, the most commonly used live trap, the leg-hold, presents serious problems when used to capture terrestrial animals. The leg-hold tends to be nonselective, *i*.e., nontarget wild and companion animals may be trapped, and if set by inexperienced trappers, the leg-hold can cause severe pain and mutilation.

The second phase of the Ministry's trap research program was therefore geared toward the development and testing of an alternative live trap, the foot-snare. A recent report in *Ontario Fish and Wildlife Review* (*18*(3):11-22, 1980) discusses the results of field tests conducted to compare the steel jaw leg-hold trap and the new foot-snare.

Two experienced trappers independently tested both kinds of trap during trapping seasons in 1978 and 1979. They used three kinds of sets (dirt hole, trail, scent post), two types of site (sandy soil, clay soil) and checked the traps daily.

Statistical analysis of the collected data revealed no difference in the frequency of animals releasing the leg-hold as opposed to the foot-snare, no difference in capture rate with the exception of skunks, which tended to elude the foot-snare, and no difference in escape rate. However, a major difference was found in the rate of injury sustained by captured animals: 52% of the animals in the leg-hold traps received cut skin, broken bones, or more serious injury, while only 2% of those caught in the foot-snare suffered comparable damage. The author of the report states: "[F]ield results to date have shown that the foot-snare is just as effective in capturing furbearers as the leg-hold trap but with a greatly reduced injury rate. Although the two trappers were initially skeptical of this new device, they eventually expressed preference for the foot-snare over the leg-hold trap because of the foot-snare's comparable efficiency and greater humaneness."