# TABLE OF CONTENTS — VOL. 1(1) 1980

## EDITORIALS
- Delineation of Journal Scope and Goals — M.W. Fox and A.N. Rowan 2
- Toward a Science of Animal Welfare — F.M. Loew 7

## NEWS AND REVIEWS 9-13
- Companion Animals
- Training for Standardbreds
- Laboratory Animals
- UK Animal Experimentation
- Farm Animals
- Hens Take to Grass
- Sodium and Egg Production
- Dairy Cow Housing Systems
- Wild Animals
- Inbreeding
- Mortality in Ungulates

## COMMENTS
- Toward a Common Ground — M.W. Fox 14
- The History and Impact of UFAW — W.M. Scott 14-17

## ORIGINAL AND REVIEW ARTICLES
- Benign Uses of Wildlife — V.B. Scheffer 19
- Livestock Behavior as Related to Handling
  - Facility Design — T. Grandin 33-52

## LEGISLATION AND REGULATION 53-56
- Horse Racing and Drug Abuse
- UK Animal Experimentation

## MEETINGS AND ANNOUNCEMENTS 57-64

## IJSAP BOOK NEWS 65-67

## MADCAP ZOOLOGIST 69

## CLASSIFIEDS 69

## INSTRUCTIONS TO AUTHORS 70

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The Institute for the Study of Animal Problems wishes to acknowledge that the International Journal for the Study of Animal Problems is supported in part by a grant from the Geraldine Rockefeller Dodge Foundation, and by a generous personal contribution from Mrs. William A. Parks.
A Background to the Journal and Delineation of its Scope and Goals

Philosophical Background

In the nineteenth century, Darwin's theories, coupled with the development of the phenomenological approach in philosophy (see Brumbaugh, 1978), led to a gradual reevaluation of man's place in nature and a growing acceptance of the thesis that man was different from other animals only in degree rather than in kind. At the end of the century, this view was reinforced by the publication of a scholarly and clearly reasoned argument promoting animal rights (Salt, 1894). The two world wars interrupted further developments along this front but, beginning in the sixties, animal welfare has increasingly relied on an expanding base of scientific material and philosophical argument. In Britain, Russell and Burch (1959) and Ruth Harrison (1964) published scientifically credible analyses of the problems of animal experimentation and intensive farming practices, respectively. These books stimulated further examination of these issues by scientists and encouraged a greater interest in the scientific aspects of animal welfare.

Recent philosophical interest dates from the book Animals, Men and Morals (Godlovitch, Godlovitch & Harris, 1971). A later book, Animal Liberation, by Peter Singer (1975), in which humanity's obligations toward animals are examined from a utilitarian perspective, has had a far wider impact. The utilitarian argument is based on the credo that one should maximize the satisfaction of 'interests' which should be given equal consideration. This does not necessarily imply that animals and human beings have equal standing, require the same treatment, or have equal rights. Other philosophers have explored the concept of animal rights from moral and legal standpoints, and there have been a number of recent meetings at which the philosophical arguments have been explored in some detail.

We find many of the current arguments about the moral status of animals not only difficult to apply in practice but also frequently inadequate in basic knowledge. The use of animal rights arguments to justify anti-vivisection and vegetarian positions is relatively straightforward, but such moral positions do not always accord with biological considerations. Furthermore, the concept of animal rights is difficult to apply to situations where the rights of human beings conflict with those of other animals — in other words, in assessing whether there are justifiable uses of animals. We are also uneasy about the fact that many ethical arguments seem to be based upon intuitive perceptions of what ought to be. Philosophers have varying views of how humanity “ought” to behave and their arguments often reflect these differences. Therefore, in the belief that it should be possible to harness scientific data flowing from human and animal psychology, physiology, ecology and ethology to establish certain ethical ground rules, we are currently trying to develop a reasoned and consistent argument, incorporating elements from both moral philosophy and biology, which is less vulnerable to changing mores and fashions in society. A very brief outline of our current approach follows.

The wolf which kills, often in a most inhumane manner, to ensure its own survival is not held morally responsible for its actions. The interaction of a wolf
with its environment is governed not by moral laws but by biological laws which, over the millennia, have contributed to a dynamic ecosystem in which all elements interact to form a relatively stable equilibrium or contingency field. However, humanity has developed extremely powerful tools for modifying the environment and modern technology usually overrides the normal biological negative feedback systems which operate in an ecosystem. This is a major problem in ensuring the long-term integrity and survival of the biosphere. One can, therefore, argue that social constraints (ethical and legal) must be developed to replace the defunct or ineffective biological constraints (at least, in the case of human activities). However, before instituting social constraints, society must have sufficient understanding of how ecosystems work so that such constraints accurately model the original biological mechanisms which they come to replace. While this argument is only at a very rudimentary stage, we believe that it could permit the incorporation of biological premises into ethical systems.

While the philosophical question of animal ‘rights’ is of academic interest, it should be noted that there are many people who see animal welfare problems in terms of a human obligation not to cause unnecessary suffering to other animals. They are more comfortable with this approach since they often perceive the animal rights concept as being too radical or as being just ludicrous. Consideration of animal welfare issues in terms of human obligations also has the advantage of Biblical foundation (Mulder, 1979).

These varied philosophical positions may not provide much practical guidance for the scientist, animal welfare worker or other members of the public. They do, however, have the potential to serve several constructive and practical purposes. The concept of animal rights focuses attention on the animal’s needs per se rather than on strictly human self-interest in maintaining healthy and productive animals. In addition, these concepts have led to a growing sophistication in the humane movement. No longer is the prevention of cruelty, important though it may be, the major (or only) goal of the larger organizations.

Deliberate cruelty toward animals, the wanton, vindictive or insensitive infliction of pain, is far less widespread than the suffering resulting from the exploitation of animals. While in general, overt, deliberate cruelty is condemned by society, the exploitation of animals in intensive farming systems (over 5 billion per annum) or in laboratories (over 200 million per annum) is either condoned or unquestioned. But the animals which are exploited in these systems are often denied facilities which would permit normal behavior or are used in experiments which cause pain and suffering. The questions surrounding such exploitation are not clear cut and involve such counterbalancing arguments as the infliction of animal suffering versus the alleviation of human suffering. The moment one moves away from the absolute position that no satisfaction of human interests or needs is worth even the smallest amount of animal suffering or exploitation, then balancing competing interests requires the application of technical knowledge and expertise as well as academic sophistry. Increasingly, animal welfare groups are acquiring that expertise and formulating sophisticated policies on animal exploitation by society and the extent to which it can be justified. The formation of the Institute for the Study of Animal Problems is an obvious example of this trend and clearly demonstrates that The Humane Society of the United States (which conceived the idea of a scientific institute and obtained the necessary funds) per-
EDITORIALS

cieves the need for technical analysis and support.

The Journal — Its Scope and Goals

Scientific and academic enquiry is, however, an international activity. A discovery or report produced in Hungary may, for example, be relevant to problems in the United States or Malaysia. The usual answer to the problems of communication between scientists or regulators separated by large distances has been the establishment of some form of periodical. Such periodicals range from highly specialized journals which publish only ‘hard’ scientific reports to popular science magazines covering a wide variety of subjects. Several publishing empires have been built on the information explosion which has occurred in the last twenty years and on the captive market consisting of the technical libraries around the world. However, the communication needs of the applied science of animal welfare are very different from those of the established disciplines, such as physiology, ecology and biochemistry, or specific fields of enquiry, such as transplant immunology.

One of the major differences is the multidisciplinary nature of scientific issues relevant to animal welfare. Apart from the obvious inputs from ethology and the physiology of pain, other relevant disciplines range from engineering (for housing systems) through reproductive physiology (for animal production) to moral philosophy. Combining all these disciplines into one journal in an interesting and relevant manner which is also comprehensible to all readers is no easy task. Nevertheless, this must be accomplished because there is a vital need to integrate results from all these different disciplines into a single applied science of animal welfare, covering companion animals, farm animals, laboratory animals and wild animals.

Another difference is the lack of any central focus for animal welfare issues in academic institutions. Several philosophy departments are developing courses on the moral status of animals, and there are a few technical institutions (e.g. the Scientists’ Center for Animal Welfare and the Universities Federation for Animal Welfare) which concentrate specifically on animal welfare science. However, in other academic organizations, animal welfare is either a peripheral concern or is, at the most, an important but not central focus of a single person’s research. Funding agencies, which usually perceive animal welfare as an ethical problem which does not qualify for scientific research grants, exacerbate this situation. Also, the institutional library market, which is already hard pressed by static budgets at a time of rapid inflation in the publishing industry, has relatively little flexibility to expand acquisitions into new fields.

With these, and other differences in mind, we decided to produce a journal to the following specifications: First, the journal should be of interest to a wide range of academic and nonacademic readers. Second, it should act as a forum for the integration and communication of widely scattered research reports, enabling scientists and other academics with a common interest to establish contact. Third, it should encourage more academics to focus on animal welfare problems per se and use the journal as an outlet for the ensuing debate. Fourth, it should establish animal welfare science as a credible and valid field of enquiry. Fifth, the journal should act as a common ground for scientists and members of the public.
EDITORIALS

to debate issues of mutual concern in a constructive and nondogmatic or
judgemental fashion. Sixth, it should act as a focus for information on legislation
and regulation and provide government officials with an ever increasing body of
reliable data on which to base decisions and the drafting of regulations. Seventh,
the subscription rate should be low enough to encourage individual subscribers.
And last, but certainly not least, the journal should provide data which allows
commercial organizations to reconcile their requirements (equated with human
needs for the sake of the present argument) with the needs of animals, thereby in­
creasing humanity’s harmony with the ‘natural’ world.

Journal Format

In order to satisfy the above requirements, we decided to base the Journal
on the flexible formats established by the major general science publications —
namely, Science and Nature. As you will see in this issue, the Journal contains a
number of sections which will, it is hoped, satisfy the different goals outlined
above. The editorial pages will contain by-lined items on a wide variety of issues
by members of the Editorial Advisory Board and Editors. These items will be
modified only to the extent necessary to conform to the Journal’s stylistic stan­
dards. The news and review pages will contain a wide range of articles covering
all types of animal welfare issues. Much of the material for these pages will come
from articles published in a broad spectrum of academic journals. The Journal
will also include comment pieces from individuals who wish to address or debate
a particular welfare issue.

The sections for review and original articles will contain full length papers,
subject to review by outside referees. These papers will review established
knowledge in a particular area, examine the scientific data supporting a certain
point of view, or report on the results of research investigations. As support for
the Journal grows, it is planned that a section for short communications will be
developed in order to disseminate the results from significant research projects
as quickly as possible.

The Journal will carry book reviews, meeting announcements and reports
from relevant conferences as well as letters from readers expressing diverse
points of view. The legislation/regulation section will report on government in­
itiatives from all over the world, and where appropriate, feature detailed
analyses of topical issues.

It is hoped that a wide range of well-written and well-reasoned articles
dealing with animal welfare issues will be represented. This leads to one final
point which should perhaps be addressed in this first issue of the Journal —
namely, the relationship between scientific ‘objectivity’ and advocacy.

Animal Welfare Science and Scientific Objectivity

Scientific objectivity is a valuable concept when training aspiring scientists
and a useful goal to bear in mind when conducting research. But under closer ex­
amination, objectivity proves to be an illusion. All experience, whether of meter
readings in a laboratory or falling in love, is affected more or less by subjective
judgments, and there is no convincing reason why so-called exact knowledge ob—
tained by the ‘scientific method’ should always claim precedence over other sorts of experience (Dixon, 1976). Scientists who claim total objectivity should be treated with caution and their work subjected to even more careful scrutiny than usual since prior experience and personal bias are bound to influence research planning and conclusions. How else can one explain the occasional very bitter arguments over two conflicting hypotheses and the frequent but less heated disputes in academic forums where the protagonists have access to the same set of data.

In scientific research, objectivity is not the critical factor underlying quality work. This place is held by self-knowledge and self-criticism so that researchers are aware of their prejudices and thoroughly analyze the assumptions on which hypotheses are based. Such awareness is ‘scholarly’, not ‘objective’, and we should strive toward a scholarly approach in which coherent reasons can be given why certain results are accorded more weight than others. Objectivity is important, but it can become a barrier to good science when pursued with single-minded purpose and at the expense of less ‘objective’ but no less important data. Such objective research produces “inert knowledge” (Mayer, 1980) and could lead to the patently absurd but, according to calculations, aerodynamically correct conclusion that bumble bees cannot fly.

The difference between ‘objectivity’ and scholarship is of more than passing interest to the Institute for the Study of Animal Problems. It has been argued that because of the Institute’s affiliation with The Humane Society of the United States, its work will be suspected of unwarranted bias. The Institute’s work will inevitably be based on the premise that scientific research can help society to improve its treatment of animals and reduce the moral tensions which currently exist. The work of animal scientists is not denigrated because their research is based on the assumption that productivity can be improved, but this assumption is no less subjective than those of the Institute. There are certainly many dangers involved in having ethical concerns underpinning the Institute’s scientific program, but if scientific data is misused to support an advocacy position, then it is hoped that such abuse will be pointed out and the argument documented. The Institute is concerned about possible conflict between its ethical position and academic scholarship and will be watching carefully for unwarranted influence.

Conclusion

There are many uncertainties in establishing a new journal, not the least of which is the question of whether enough individuals and institutions are sufficiently interested to pay the subscription price. We consider that there are in fact, a large enough number of people who would be interested in an academic journal covering animal welfare science in the broad-based manner described earlier. However, finding and reaching those individuals is not easy. The Bulletin of the Institute has been distributed to well over five thousand individuals and yet there are probably ten times as many who might have been interested in receiving it. We therefore need the assistance of our readers to promote the Journal among the global community of researchers and others interested in animal welfare science.

The success of the Journal will also be heavily dependent on the input
EDITORIALS

received from readers and on the quality of items submitted for publication. The format and content are not immutable — in fact, a number of relatively new ideas for an academic publication are being explored. Your suggestions will be vital in helping to produce a quality, comprehensive and responsive Journal. Ultimately, success will depend on the extent to which the perceived or actual needs of the potential readership can be met. Your active participation in determining those needs is essential.

Michael W. Fox
Andrew N. Rowan
Editors-in-Chief

References


Toward a Science of Animal Welfare

It would be difficult to overestimate the significance of medical research, especially in the past 100 years, for the relief of human suffering. Many of the infectious diseases such as diphtheria, whooping cough, tetanus, poliomyelitis and smallpox are either entirely preventable or have been virtually eliminated. Surgical techniques inconceivable even twenty years ago are almost commonplace today. Life expectancy in this country, while not the highest in the world, is higher than it has ever been. In addition, many animal diseases such as canine distemper, rabies, or feline panleukopenia, are now preventable by vaccines developed in research laboratories.

The research which has been the basis of most of this progress was usually carried out in animals. Indeed, without animals, mankind would either not have the knowledge gained from their use or the knowledge would had to have been gained in some other way — human experimentation, research on other forms of
life (e.g. plants), contemplations, or sudden insight. As a result of all this, criticism of all or some aspects of the use of animals in research has usually fallen on deaf ears.

However, the increasing use of animals in research has been challenged by persons and organizations (often indiscriminately called “antivivisectionists”) ethically or otherwise opposed to this practice. The various arguments used by either critics of all or some animal use or by scientists will be familiar to most readers. Often, these arguments are based on assertion, and are won or lost on the basis of glibness or emotion (e.g. puppies vs. leukemic children); they can be said to suffer from a lack of facts.

Short of the abolition of the use of animals in research, what is urgently needed is an expansion of the body of knowledge concerning animal requirements for space, social interaction, and other environmental components on the one hand, and on the other, an increasing realization by scientists that in certain fields, animals may no longer be the best means of obtaining scientific information. Since nonanimal techniques are also usually less expensive, attempts to develop them scientifically have potential for cost-effectiveness (as long as their results are acceptable).

In other words, we need to supplement the bodies of information called laboratory animal science or laboratory animal medicine with what the Institute for the Study of Animal Problems has called “animal welfare science.” In so doing, the ways of maintaining animals in laboratories can only be improved. If, as well, animal replacement techniques can be developed that really do replace certain animal uses, then perhaps scientific, humane, and probably economic aspects of research will have been enhanced.

Veterinarians in laboratory animal medicine, scientists conducting research, technicians responsible for animal care, and all others involved in the use of animals in research are asked to consider some of these problems and to develop scientific solutions. Finally, reference should be made to the fact that some animal experiments involve the experience of pain and discomfort by the animals. Surely, ways must be found to continue to improve the systems designed to reduce these types of experiments to the true minimum.

This new journal is an attempt to provide a forum for scientifically acquired information which bears on the sorts of animal problems in research referred to above. I hope that members of the scientific community will give it a chance to fill a role in the evolution of ever improving animal care and use in research.

Franklin M. Loew, D.V.M., Ph.D.  
Editorial Advisory Board
Training for Standardbreds

The American Standardbred racehorse is subjected to an outmoded and frequently harmful training program, according to Tom Ivers, trainer and owner of Olympic Stable in Delaware, Ohio. The Palo Alto training system, developed in the mid-1800's by Leland Stanford, a former governor of California, rests on the assumption that trotters are born rather than made, and that their inherent ability need only be "awakened" through short mileage sprint training at an early age. Training and racing yearlings also offered the attraction of accelerated returns on breeding investments. This philosophy gained acceptance in the racing industry at a time when horses jogged the major part of a course and sprinted the final quarter. However, the style of Standardbred racing has changed to an all-out mile sprint, and under these conditions the Palo Alto regimen is, in the words of Mr. Ivers, a "guaranteed crippler."

Ivers supports his statement with racing industry data on injuries to Standardbred horses. Veterinarians attribute 70% of Standardbred racing injuries to lack of conditioning and fatigue, i.e., weakness in the muscles and tendons of the lower leg. According to Dr. Matthew Mackay-Smith (Equus 21:63, 1979), both the way horses are trained and factors in the horses' form and structure determine their susceptibility to lameness. The Palo Alto system, with its emphasis on developing speed in a relatively heavy-boned horse bred for trotting, fails to build essential heart-lung and local muscle strength and endurance. The animal welfare implications are obvious: a high percentage of track breakdowns (physical injury which prevents a horse from finishing a race) and the increased pre-race administration of drugs to alleviate symptoms without really attacking their cause. [See: Legislation/Regulation.] Ivers believes that the emphasis must shift from pharmaceutical treatment of symptoms to prophylaxis by means of an appropriate training program.

Studies in exercise physiology have given rise to a training principle known as neuromotor specificity, which refers to the fact that neuromotor and biochemical changes produced by training are specific to the demands of the activity. Training for an event such as the Standardbred mile race, which incorporates speed, strength, stamina and coordination, must combine aerobic and anaerobic exercises designed to develop these different qualities. Although selective breeding plays an important role in producing animals which embody the optimum features of temperament and physique for racing, proper conditioning remains the crucial factor in ensuring that these animals reach their full athletic potential.

Mr. Ivers, in collaboration with exercise physiologist Paul Lessack of Bethlehem, Connecticut and former Ohio State track coach Frank Lubovich, has developed a training program engineered to bring both aerobic and anaerobic metabolisms to peak efficiency. Training begins with light aerobic exercise, gradually building up to cover longer distances. Long, slow workouts strengthen the heart.
and local muscles, thicken the bearing surfaces of bones (thus reducing the changes of stress fractures), and increase the oxidative capacity of muscle cells. The second phase, intended to build heart-lung and local muscle endurance, combines aerobic and anaerobic exercise in a series of long, strenuous intervals punctuated by shorter periods of complete rest. The third phase consists of fast intervals at near racing speed, anaerobic workouts in which exertion demands exceed the heart’s capacity to supply oxygen to the local muscles. Running on oxygen debt results in the production of lactic acid in the muscle cells, inhibiting contractions and causing fatigue, pain, soreness and often, injury. However, proper anaerobic conditioning prepares the body to handle the increased workload by raising the level of blood alkalines which in turn prevent the excessive accumulation of lactic acid in the muscle tissue. Only in the fourth and final stage, short sprints at 100% efforts, does the development of pure speed become the focus.

Ivers and his colleagues have tested this alternative training program on eight horses with previous racing injuries. After one year of testing on the training track, the horses were in condition and exhibited no behavioral or physical signs of pain or injury.

The Ivers system challenges the idea of the racehorse as 'natural athlete' and for this reason may encounter resistance from trainers who are reluctant to devote the additional time and energy this system requires. Nonetheless, as Mr. Ivers points out, breeders and owners are losing their investments whenever their horses break down on the track. Prevention of injury through appropriate conditioning and a corresponding decrease in the use of drugs may save money in the long run as well as improve the welfare of the Standardbred racehorse.

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LABORATORY ANIMALS

UK Statistics on Animal Experimentation

Approximately 5.2 million live animals were used in experiments in the United Kingdom during 1978, according to the government publication Statistics of experiments on living animals, Great Britain 1978. This figure represents a slight drop from the reported 1977 total of 5.4 million, conforming to the pattern of fluctuation around the 5.5 million mark which began to emerge after a 1971 peak of 5.6 million.

The twenty-two tables included in the report present a detailed breakdown of experiments into categories such as type, purpose and technique(s) used. Close examination of this data reveals certain trends which may be otherwise masked by the overall figure quoted above. For example, although the number of experiments involving safety testing of cosmetics and toiletries rose 15% from 1977 (24,612) to 1978 (28,238), the largest number by far (2.9 million) continued to be devoted to the selection, development, use, etc. of medical, dental and veterinary products and appliances. The other major group of experiments (1,164,846) were directed to the study of normal or abnormal body structure and function. Interestingly, within the slight overall decline in the number of experiments concerned with neoplasia, the greatest decrease (-18% between 1977 and 1978) occurred in the category of carcinogenicity screening.

Among the 2.9 million experiments performed on live animals for medical, dental or veterinary product development, selection and study, nearly 300,000 were acute toxicity tests. Acute toxicity tests also accounted for more than half of the 88,000 experiments on the safety of industrial products, one-third of the
A comparison of the 1977 and 1978 figures on the reasons given for performing experiments indicate a decrease of 29% in medical diagnostic tests and moderate increases in safety and hazard testing required by legislation and regulations such as those from the Common Market which are now widening the range of drugs and other substances covered by the LD50 test.

Marked changes between 1977 and 1978 also appear in the distribution and prevalence of techniques used in various types of experiments. The number of medical, industrial, household and cosmetic product experiments using the Draize test, which involves the direct application of undiluted substances to an animal's eye, dropped 32% from 31,395 to 21,500. (Approximately 19,000 of these tests were performed without anesthetic.) Tests involving burning and scalding by any means dropped 61% from 6,561 to 2,551. Significant decreases can also be seen in the numbers of nonbehavioral studies entailing interference with other senses (-50%) and interference with the central nervous system (-43%). However, this trend seems to be offset by an increase in behavioral experiments using aversive stimuli (34,075; +20%) or other means (9,167; +64%) to induce psychological stress in an animal subject.

**FARM ANIMALS**

**Hens Take to Grass**

A preference test conducted over four weeks on 16 hens revealed that the type of cage floor rather than the cage size was the primary factor in choice of housing (Brit. Vet. J. 134:469, 1978). Birds exposed to both battery cage and hen-house/run environments were presented with contrasting pairs of cages in a T-maze construction. Although the birds which had been kept in (not merely exposed to) an outdoor facility displayed quicker responses to all proffered environments than their battery-caged counterparts, both sets of birds reacted faster to the same alternatives. When presented with the contrasting pairs, large/small and grass/wire, the hens chose the large cage and the grass floor, respectively. However, when size and floor type appeared in combination they chose small grass cages over large wire ones.

Preference tests which allow the animal rather than the keeper to choose between different environments sometime produce surprising results. In this case, the disadvantage of battery cages is seen to lie more in the type of interior and not so much in the degree of confinement. It follows that housing improvements designed from the vantage point of animal welfare might concentrate on better equipping presently available cages rather than on the costlier proposition of increasing space.

**Sodium and Egg Production**

Feeding laying hens a low sodium diet to induce a pause in egg production is gaining popularity. The purpose is either to reduce egg productivity over a short period in times of market surplus, or to prepare a flock for a second laying cycle. Earlier studies have suggested that this technique may be more humane than starvation and water deprivation to induce ‘forced moulting’ and that no specific behavioral problems appeared. Behavior problems such as toe and foot pecking have been reported under field conditions in birds on low sodium diets. B.O. Hughes and C.C. Whitehead, in a paper entitled “Behavioral Changes Associated with the Feeding of Low-Sodium Diets to Laying Hens” (Appl.
Anim. Ethol. 5: 255-266, 1979) investigated this welfare question and summarized their study by stating that:

"...A pilot experiment showed that under some circumstances damaging pecking did occur when low-sodium diets were fed, particularly so in combination with high calcium levels. Sodium-deprived birds showed an increased tendency to peck at novel objects, but did not increase their intake of sodium-supplemented diet when offered a choice.

"The problem was then investigated on a larger scale by allocating hens of 2 separately-caged strains to one of 9 treatments, housed in bright light and in groups of 6 per cage, with 3 levels of sodium and 3 of calcium. The increased calcium levels had no effect on either cannibalism or feather condition, but cannibalism was seen in birds receiving both low (0.003% Na) and intermediate (0.03% Na) levels of sodium, although not in the controls (0.13% Na). The effect was more marked in the medium hybrids than in the light hybrids. Feather condition was unaffected by sodium deprivation. It is argued that the problem is a husbandry and management one and that, in spite of these adverse effects, sodium depletion remains a useful method for inducing a pause in egg production." (p. 255)

The authors addressed the ethical question of depriving birds of an essential nutrient as follows:

"It has not yet been established how much suffering is involved when an animal is deprived of an essential nutrient but it may be substantial if the period is a long one. It is probable, however, that suffering is less in the case of sodium than in the case of calcium, for example, for three reasons. Firstly, the very weak selection response suggests that there is not very much positive post-ingestional feedback, implying that the adverse effects which are being reversed are not severe. Secondly, the birds do not lose body weight (Whitehead and Sharp, Br. Poult. Sci. 17:601 1976) as they do under most nutritional stresses. Thirdly, there is evidence that once they are out of egg production they go back into sodium homeostasis." (pp. 264-265)

They concluded that this method would be more acceptable from a welfare viewpoint if the birds were kept under reduced illumination in small groups of no more than four per cage.

**Dairy Cow Housing Systems**

Professor J.L. Albright (Purdue University) discussed the various housing needs of dairy livestock and developments in housing systems at the 1979 Farm Builders Conference in West Lafayette, Indiana. He noted that the long-term effects on livestock housed on concrete floors throughout their productive life have not yet been adequately analyzed. There is present concern over this type of environment in relation to the behavior, reproductive functions, under health, and foot and limb structure of cattle.

Many dairymen now remove the cows from concrete, at least during their dry period. Cows have also been moved to exercise or pasture areas whenever feasible in order to rest their feet, legs and udders. Some new confinement systems employ a combination of concrete flooring and dirt lots to allow cows to be programmed off concrete for several hours each day.
Steel and concrete slatted floorings have never been totally satisfactory for dairy cows, reported Albright, and their use has decreased over the past 15 years. In a two year study at Purdue University, 32 Purdue Holsteins housed on a natural dirt base with sawdust/shavings bedding were compared with cows housed on slatted floors with permanent bedding on concrete. Those cows housed on dirt produced an average of 3 pounds more milk per day, had lower leucocyte counts during three quarters of the study, stayed cleaner, exhibited fewer cases of clinical mastitis (13 vs. 29), had fewer foot and leg injuries (5 vs. 12) and also rested easier, lying down an average of one hour more per night.

These results indicate that increased productivity and improved animal welfare can go hand in hand with conscientious management methods.

WILDLIFE

Inbreeding Mortality in Ungulates

As the world's wildlife population continues to decrease due to human encroachment and intervention, the issue of inbreeding takes on a new significance. Drs. K. Ralls, K. Brugger and J. Ballou recently completed a study at the Smithsonian Institution in Washington, D.C. on the relation between inbreeding and juvenile mortality in small populations of ungulates (Science 206: 1101-1003, 1979).

The researchers analyzed data primarily from records of the National Zoological Park in Washington, D.C. of 16 species of captive ungulates which recorded the number of inbred calves (all young with an inbreeding coefficient greater than zero) and noninbred calves (those young with unrelated parents) that survived six months or more. The records showed that the mortality rate in inbred young was higher in all but one of the species reviewed. Significantly higher mortality rates were found in half of the species studied (four species with the largest sample sizes and four in which the sample size was small but the mortality of inbred young was very high). The authors admit that they did not analyze most of the data with respect to variables which might have influenced the juvenile mortality figures, except in the case of one species where factors such as birth season, management improvements, birth order and possible differences between wild and captive born females were examined and proven insignificant in their effect on the high mortality rates of the inbred young.

These findings lend credence to the claim that inbreeding within captive populations of exotics is a serious problem which often goes unrecognized when zoos fail to maintain detailed records. The authors urge that in order to preserve genetic variability in small populations of ungulates, sound genetic management programs should be instituted prior to the appearance of inbreeding deficiencies in individual species.
Toward a Common Ground

M.W. Fox

Some members of the biomedical research establishment (and others involved in one form of animal utilization or another) may see this Journal as a new front for humane and antivivisection groups to be used to further abolitionist goals (i.e. no animal experimentation or exploitation of any kind regardless of ends justifying the means). Such an interpretation is to be expected, considering the defensive posture that many biomedical researchers have had to take when confronted by certain animal welfare groups. But such an interpretation is now behind the times if not immature: the time has come for all to consider scientific, ethical, moral and other aspects of animal welfare with honesty and integrity. This is a challenge, not a judgment; a scientific and intellectual quest, not a front or subterfuge either to convert humanitarians into accepting the instrumental rationalism of unconditional animal exploitation or to seduce biomedical scientists who work with animals to the antivivisectionist’s idealistic and often anthropomorphic abolitionist point of view. This Journal represents the middle way, the common ground where the questions concerning the present and future welfare of animals may be explored and debated, and advances made for the benefit of all.

The History and Impact of UFAW

W. N. Scott

Historical Perspective

At a meeting at Birkbeck College in 1926 Charles Hume started the University of London Animal Welfare Society (ULAWS) with a membership of two. The society was declared open to graduates and undergraduates of the University of London, to senators, officers and teaching staff of the University, and to veterinary surgeons practicing in London.

An objective and realistic approach to controversial animal welfare topics formed the basis of ULAWS' policy. Animal problems should be tackled on a scientific basis with a maximum of sympathy but a minimum of sentimentality. It was considered that the universities provided the best recruiting grounds for the
right type of person, both scientific and otherwise, with the right sort of information to help with animal welfare activities.

There were eleven members of council with scientific qualifications, among them Kenneth Bird (Fougasse), and eleven members who had graduated in the Arts, including a rabbi and a barrister-at-law. Problems investigated at this time were the fur trade, humane slaughter, oil pollution and the trapping of rabbits. Liaison was also established with societies in France, Holland, Germany, Italy, Greece, Spain, North Africa, Canada, Australia and the USA.

By 1938, ULAWS' publications list included over 30 monographs, reports and booklets on various aspects of animal welfare and a series of wall posters illustrated by Fougasse as Honorary Artist. In the same year, in order to widen the scope of the organization and spread its influence outside London, the Universities Federation for Animal Welfare (UFAW) was set up, with ULAWS as its first branch. The second world war then intervened and several staff joined the services. Nevertheless, UFAW continued, albeit with a reduction in activities.

Post War Research and Growth

With the cessation of hostilities in 1945 and the return of staff from war work, various projects were developed. Probably the most noteworthy was the preparation of the UFAW Handbook on the Care and Management of Laboratory Animals which was published in 1947. At the same time, a research student appointed by UFAW began to study methods of rabbit control in Wales. Papers were published which provided sound arguments for the humane control of wild rabbit populations and the eventual abolition of the gin or leghold trap which became illegal in England and Wales under the Spring Traps Approval Order 1957.

Dr. Phyllis Croft, who had joined UFAW in 1950 and has been working at the Neuropsychiatric Research Centre, Cardiff, defined in a published paper the conditions requisite for ensuring humaneness in the electric stunning of pigs. She also had articles accepted by veterinary and medical journals on the humane electrical stunning of small animals and the effect of electrical stimulation on the perception of pain. Her work laid the foundation for future developments in this field and in 1957 the British Standards Institution's Committee embodied her recommendations in British Standard 2909.57, "Cabinets for the Electrical Euthanasia of Dogs." Subsequently, Dr. Croft, who had become an expert in the field of animal electroencephalography, worked on relaxant and anesthetic drugs in a laboratory provided by the Royal Veterinary College, London.

Other research work by UFAW included the anesthesia of pigs with carbon dioxide before slaughter, the humane killing of crabs and lobsters, and efforts to find a suitable narcotic poison, or a humane acute poison, for the control of rodents. Largely as a result of scientific information supplied by UFAW, the Animals (Cruel Poisons) Act 1962 became law in 1963. This empowers the Home Secretary to prohibit or restrict all poisons which cause undue suffering, provided that alternative methods of destruction are available.

In 1957, Fougasse, who illustrated so many of UFAW's publications, was elected Chairman of the Board of Governors. In the same year, UFAW became incorporated under the Companies Act as a Company limited by guarantee, and by
special permission of the Board of Trade the word ‘limited’ after the name of UFAW was not required. Major Hume was appointed Secretary-General and in the 1962 Queen’s Birthday Honours List he was awarded the Order of the British Empire in recognition of his work in animal welfare.

Recent Accomplishments

The following years saw many changes in UFAW staff due to retirements, resignations, marriages and deaths. I joined as Scientific Director in 1964 and worked with Major Hume until his retirement in 1965. Fougasse died in the same year. He had been UFAW’s honorary artist for nearly forty years and his numerous drawings contributed much to its success.

Various research projects were undertaken during the 1960’s and 1970’s by staff which included biologists, educational theorists and veterinary surgeons. Investigations into seals, otters, foxes and badgers suggested the necessity for more humane methods of control and, indeed, led eventually to legislation which afforded some protection to these species.

The behavior of sheep and poultry kept under intensive systems of husbandry was studied in depth and scientific papers were published. Research into humane methods of killing poultry provided basic information for the Government to implement the Slaughter of Poultry Act in 1970. Work on tissue culture techniques which might provide suitable alternatives to the use of laboratory animals was also initiated.

In 1967, Mr. Stewart Huston of Coatesville, Pennsylvania approached UFAW for assistance in the protection of feral goats on Holy Island in the Firth of Clyde, which he owned. Mr. Huston made annual visits to the island and took a great interest in safeguarding both the animals and the archeological features. He also gave UFAW great help and encouragement in establishing a Field Study Centre for use by members and visiting scientists. When Mr. Huston died in 1971, his trustees offered the island to UFAW and it became the Federation’s own property the following year. Progress has since continued and facilities developed to maintain Holy Island as a sanctuary for animals and a place where their activities can be studied.

UFAW has probably exerted the most influence through its publications. The Handbook on the Care and Management of Laboratory Animals had established an international reputation. Further enlarged editions appeared in 1957, 1967, 1972, and 1976. The Handbook on the Care and Management of Farm Animals was published in 1971 with a second edition in 1978. The technical publication Humane Killing of Animals was translated into Arabic, German, Greek, Italian, Japanese, Norwegian, Portuguese, Spanish and Thai and distributed in the various countries concerned. From 1968 to 1978, twelve symposia were held on animal welfare subjects and the proceedings made available. Over twenty papers were also published in scientific journals.

Balance and Change

Opinions vary widely in different sections of the community as to morally acceptable standards for animal welfare. Conflict exists between the emotionally
desirable and the economically practicable and a solution is not always possible. UFAW’s advice and policies have been consistently rational and practical, striking a balance between the humane treatment of animals on the one hand and human needs on the other. This approach may not attract those who feel that achievements are possible only by dramatic and sensational means. Yet, as this very abbreviated history demonstrates, some success has been achieved.

In many ways UFAW has acted like a catalyst, producing effects without undergoing any change in itself. Nonetheless, UFAW welcomes new ideas and looks forward to a productive future under the new directorship of former Liverpool University senior lecturer in animal husbandry, Roger Ewbank.□

Profile

Roger Ewbank was appointed Scientific Director of UFAW in June 1979. He qualified from Liverpool Veterinary School in 1957 and after 3 years in practice returned to Liverpool as Lecturer in Animal Husbandry. Ewbank’s work has evolved from an interest in health and disease of farm animals to a more specific interest in farm animal behavior. He was instrumental in establishing applied ethology as a serious subject for study in Britain, and was awarded the M.V.Sc. for his thesis on “Nursing and suckling behavior in sheep and its relation to lamb growth.” Since then Ewbank’s main interest has been the social behavior of cattle and pigs. The significance of this basic work to the welfare problems posed by modern farming methods has been widely recognized. In 1970, Ewbank was appointed by the Minister of Agriculture to his Farm Animal Welfare Committee and to several other advisory committees and study groups. In 1978, he was appointed to the British Veterinary Association Welfare Sub-Committee and to the Scientific Committee of the International Society for the Protection of Animals (ISPA).

Profile

Major Walter N. Scott served as Scientific Director of UFAW from January 1964 to June 1979. Scott joined UFAW at a time when his expertise was particularly valuable in preparing UFAW’s evidence to Government Committees set up to investigate animal experimentation, intensive farming and the use of toxic chemicals in agriculture. His notable achievements include the editing of the 4th and 5th editions of the UFAW Handbook on the Care and Management of Laboratory Animals; the 1st and 2nd editions of the Handbook on the Care and Management of Farm Animals; and the establishment of annual symposia to which established scientists came and spoke freely about welfare problems in their particular fields, such as the control of pests, toxicology, and the transport and slaughter of food animals.
Abstract

During the Age of Environmental Awareness, which dawned in the late 1960's, Americans turned to using wild animals more benignly (or in ways harmless both to individuals and populations) and less exploitatively. The evidence includes: new federal legislation reflecting a public shift toward benign uses, growth of interest in 'nongame' wildlife, growth of interest in wildlife watching (rate of increase in number of camera safaris estimated at 32% per annum in 7 recent years), growth in membership of animal-interest organizations (rate of increase estimated at 7.7% per annum in 15 recent years), and growth of interest in animal rights. Per capita participation in sports hunting, an activity which long represented the dominant use of wildlife, is decreasing. Popular sentiment, as distinct from zoological and economic considerations, increasingly influences wildlife use decisions.

Introduction

In this paper I shall examine community attitudes in the United States toward uses of wildlife — or birds and mammals exclusive of domestic animals and pets. I shall offer evidence that growing numbers of Americans are using wild animals benignly, i.e., in ways noninjurious both to individuals and to populations.

The word benign is employed because benign is analogous to sympathetic and harmless, and thus has implications for both popular feelings and popular actions toward animals. Benign uses of wildlife include bird- and beast-watching, bird feeding, photographing at amateur and professional levels, sound recording (e.g., of birds, wolves, and whales), and similar activities. Benign uses have also been called nonexploitive and nonconsumptive uses (Fazio and Lawrence, 1977). They grade into low-consumptive uses, e.g., harassing for research, live capturing, and killing at low rates of exploitation. Properly designed and carried out, these operations have little impact on animal populations.

By long tradition, the wild animals of the United States belong (if that is the right word) to all its people. The fifty state governments have primary legal jurisdiction over them, while the federal government either shares or preempts jurisdiction for certain classes, including endangered species, migratory birds,
marine mammals, and species living on federal lands. I emphasize, however, that public attitudes and preferences with respect to the uses of wildlife are first voiced, not at government levels but at citizen levels. Attitudes and preferences are given shape by zoologists, economists, and other specialists within wildlife agencies (commonly called game departments) and eventually become new statutes of law (Scheffer, 1976).

Federal Legislation For Benign Uses

All wildlife legislation has one or more of the following goals: 1) to control damage by animal populations grown injurious to man or to his goods; 2) to preserve wildlife stocks; 3) to prevent cruelty to animals; and/or 4) to enforce popular sentiment with respect to particular uses (e.g., the benign use of deer in national parks). Historically, lawmakers have dealt with these goals in the order listed. Protection from wild beasts and agricultural pests received early attention; conservation as a means of ensuring sustained yields of animal products and of ‘banking’ genetic capital was subsequently recognized; humaneness was later seen as an emotional good — as an enlarging of the human spirit; enforcing public taste through plebiscite was last to be perceived and agreed upon as a proper exercise of the legislative process.

I do not propose to deal with the first goals except to note that the ideological distance between the 3rd and 4th goals — humaneness toward animals and benign use of them — is slight. Wildlife legislation is beginning to reflect community opinion that wild animals are earthly companions which ought not to be used destructively, even when that destruction is accomplished quickly and painlessly — or in other words, ‘humanely.’

Some years ago, a South African entrepeneur proposed to raise pedigreed Dalmatian dogs for their attractive spotted pelts (Anonymous, 1972). He was halted by the government on the grounds that he would be acting, not cruelly, but contrary to public taste. The point here is that citizen influence on an animal use decision stemmed from intuitive, rather than rational, convictions. The law gave greater weight to emotional than to intellectual arguments.

The history of certain federal legislation illustrates the evolution of benign use in the United States. (Full legal citations to the following laws and treaties are given by Bean [1977]).

The Bald Eagle Protection Act of 1940 was federal legislation for a wholly novel purpose — to preserve a wildlife species — a national emblem — for its symbolic value.

The Lacey Act Amendments of 1949 prohibit the importation of wildlife under conditions known to be “inhumane or unhealthful” (Bean, 1977). This act may represent the first moral stand taken by Congress with respect to the treatment of wildlife.

The Animal Welfare Act of 1966 as amended in 1970 and 1976 confirms the right of the federal government to protect animals from abuse. It stipulates that mammals transported or held in captivity for research, sale, or exhibition shall be treated humanely. (See also Visscher, 1971).

preserved. The 1973 act did list six wildlife values: "esthetic, ecological, educational, historical, recreational, and scientific" [87 Stat. 884, Sec. 2 (3)].

The Wild, Free-Roaming Horses and Burros Act of 1971 is rich in sentiment. It calls for humane treatment of these domestic animals gone feral and, more germane to the present argument, makes clear that most Americans do not want wild horses and burros used for meat, hides or glue, but rather, to be let run free as "living symbols of the historic and pioneer spirit of the West" (Humane Society of the United States, 1978).

The Marine Mammal Protection Act of 1972, although primarily a resource conservation measure, specifies that marine mammals shall not be harassed. Moreover, if they are taken dead or alive, the taking must involve "the least possible degree of pain and suffering practicable" [86 Stat. 1027-1046, Sec. 3 (4)]. The act bans the importation of any marine mammal or its products if the animal was nursing or was under eight months old, a novel provision designed to halt the importation of newborn harp seal skins. And the Act prohibits the importation of any marine mammal or its products if the animal was pregnant.

The portions of the Act dealing with suckling and pregnancy have no precedent in federal law and are based on pure sentiment. (It could be argued, perhaps, that if a female seal must be clubbed, the economically best time to kill her is not while she is pregnant but just after she has replaced herself as a unit in the population.)

In 1978, the Globe Fur Dyeing Corporation complained in a court action against the United States Government that the suckling provision of the Marine Mammal Protection Act "was a political response to public concern and emotionalism and bears no reasonable relationship to the goal of the Act and is therefore unconstitutional" (U.S. Department of Justice, 1978). The government disagreed; it denied the plaintiff's motion.

Earlier marine mammal laws, among them the Fur Seal Act of 1970 and the Whaling Convention Act of 1949, had dealt only with the conservation of stocks; they were blind to popular sentiment (Bean, 1977; U.S. House of Representatives, 1972). With respect to whaling, Scarff (1977) has written:

Despite the strong, articulated convictions of many people that whaling is immoral, the IWC [International Whaling Commission] has continued to manage every stock of every species of whale based on the assumption that maximum sustainable harvesting is the socially optimal policy. The IWC has never recognized nor discussed the ethical justification for killing whales, and whales have never received protection from the IWC for ethical, moral, or aesthetic reasons.

The Fish and Wildlife Conservation Act of 1979 (H.R. 3292) was passed in the House of Representatives in July 1979 but as of October 1979 had not cleared the Senate. It is the latest version of three bills aimed at helping the states fund their nongame wildlife programs. ('Nongame' is discussed in the next section.) In 1977, Congress drafted H.R. 8606 which would have authorized annual appropriations to the states. Leading conservationists criticized it on the grounds that annual ap-
propiations, rising and falling as they do with the changes of Congress, the President, and the Office of Management and Budget, are notoriously unreliable. The second bill, H.R. 10915, introduced in 1978, met that criticism by authorizing an 11% manufacturer’s tax on bird seed, bird houses, bird baths, certain items of camping equipment, and certain binoculars and spotting telescopes. That bill, too, died in Congress and was replaced by H.R. 3292. The prime sponsors of H.R. 3292 mention the “90 million Americans who each year venture into the outdoors to enjoy our nongame wildlife heritage” (Breaux and Forsythe, 1979).

The development of benign-use legislation can be seen as a widening of wildlife’s constituency. Bean (1977) puts it this way:

The expansion of the various wildlife values recognized by federal wildlife law, and of the meaning of the very term ‘wildlife,’ is...both a cause and result of yet another clearly discernible trend, the opening up of that body of law to the interested citizenry. If the concept of wildlife as a public trust resource has any meaning at all, it is that the views of the public must be fully taken into account in all decisions affecting the use of that resource.

**Growth of Interest in Nongame Wildlife**

One indication of a societal shift toward benign uses of wildlife is new interest in nongame wildlife. ‘Nongame’ is a curious, negative appellation, coined a decade ago by game department strategists who were groping to understand and to measure public sympathy for animals free and undisturbed, in contrast to hunted or trapped ones. Under new pressures to manage wildlife democratically, not solely for exploitive users, they responded by proposing nongame programs designed to protect chipmunks, herons, eagles, harbor seals, dolphins, and other species which rarely had been hunted or trapped.

Yet even recently, Russell Train (1978) wrote that “$97 out of every $100 spent by the federal and state governments on wildlife management goes to less than 3% of the species...used for hunting, trapping, or fishing.”

**Historical Perspective**

Certain events in the evolution of the nongame wildlife movement are historically significant:

**1969-1971** In 1969, the International Association of Game, Fish and Conservation Commissioners (1972) appointed a committee to consider the requirements and potentials of nongame wildlife. The committee, after digesting the returns from questionnaires it had sent to all the states, gave its report in 1971. It recommended that “nongame wildlife should be defined by exclusion.” (That fauna would, in effect, be the residue left after the species commonly hunted and trapped had been provided for.) Further, “States not having authority to manage nongame wildlife should strive to gain and utilize such authority.... Federal assistance in funding...could encourage state participation. The money for such programs should be from the General Fund and be matched by state General
Fund money in lieu of monies now contributed by hunters and anglers through state licensing systems and federal excise taxes."

**1972** Winchester-Western Division of Olin Corporation (a manufacturer of ammunition) published a booklet on model legislation for a state nongame wildlife program (Madson and Kozicky, 1972). It stipulated that the financial support for any such program should come in part from a prescribed "per centum of the amount of revenues raised in the preceding fiscal period from the sale of hunting, fishing and trapping licenses." (But why, one may ask, should the conservation of chipmunks and herons wax and wane with revenues from hunting licenses?)

**1972-1973** Durward L. Allen (1972), professor of wildlife ecology, addressing a national audience, called for a new North American wildlife policy: "I suggest," he said, "that we are at a time in our history when men must rise to a new level of sophistication in their attitudes toward the earth and the life it supports... Game management is only part of the culture and custody of living things." Allen was appointed chairman of a committee to write a new policy, which was duly written in 1973 (Allen, 1973). The policy noted that "a new trend is in progress. Game and fish agencies are getting broader responsibilities as wildlife agencies. Ways are being found to supplement their license-based funding through special taxes and appropriations representing contributions of the general public."

**1972-1974** In 1972, the Council on Environmental Quality and the U.S. Department of the Interior appointed Roland C. Clement, vice-president of the National Audubon Society, as chairman of a committee to "provide management policy guidelines for the nonconsumptive uses of wildlife" (Clement, 1974). In 1974, the committee offered the following recommendations: that a new federal law be enacted which would provide federal funds of at least $30 million annually for nonconsumptive wildlife conservation, that these funds be matched by state funds, and that "the objective and result of this new funding shall be a more inclusive national wildlife conservation program, to include enhancement of wildlife values in urban areas wherever possible" (Clement, 1974).

**1975** Two workshops attended by 31 experts in research and management of terrestrial or aquatic wild animals were held in Arlington, Virginia under the auspices of the Council on Environmental Quality, the World Wildlife Fund, the Ecological Society of America, the Smithsonian Institution, and the International Union for Conservation of Nature and Natural Resources (Hill, 1976; Holt and Talbot, 1978). The participants concluded, in part, that

\[ \text{The ecosystem should be maintained in a desirable state such that } (a) \text{ consumptive and nonconsumptive values could be maximized on a continuing basis [emphasis added], } (b) \text{ present and future options are ensured, and } (c) \text{ risk of irreversible change or long-term adverse effects as a result of use is minimized (Holt and Talbot, 1978).} \]

**1976** The Council on Environmental Quality sponsored another national symposium for professional and lay persons involved with wildlife management. One result was a comprehensive, critical, well-balanced book authored by 43 leaders in that field (Brokaw, 1978). Among the conservation problems singled
out by the authors were five main ones:

...the narrow focus on game of many wildlife activities, the problem of predator control, the need for an ecosystem approach to wildlife management, the need for better ecological information as a basis for effective action, and the application of the public trust concept to wildlife on our public lands (Brokaw, 1978).

It appears significant that the problem first listed is how we Americans are to broaden our vision to see wildlife as more than 'game.'

1974-1979 The state game departments tried various schemes for funding nongame wildlife management. Among them were the sale of personal automobile license plates, private and corporate donations, taxes on cigarettes, and the sale of stamps and stickers (Jahn and Trefethen, 1978; Wildlife Management Institute, 1978). As of early 1979, New York was weighing the merits of a fish and wildlife lottery and the sale of wood from state lands (Faber, 1979). Also in 1979, the game department of Washington state asked the legislature for $6 million from general tax revenues (O'Connor, 1979). What is significant here is that the game agency of an important hunting and trapping state had at last been obliged to seek financial support from the general public. Its action was an ideological retreat from the position that sportsmen have proprietary claims to wildlife which others do not.

Colorado, among other progressive states, now has a Nongame Advisory Council, a quasi-official arm of the State Division of Wildlife. "It has had a strong involvement in the philosophy that all wildlife species must be given fair emphasis in wildlife management programs" (Ryan et al., 1978).

One of the lessons to be learned from the history of the nongame movement is that many Americans are alienated by state game administrators who persist in classifying wild animals as either target or nontarget species. What these Americans want is classification by use. They want administrators to provide for a broad spectrum of public uses, whatever the animal species, corresponding to public preferences for those uses.

Growth of Interest in Wildlife Observation

There is evidence from both public opinion surveys and personal inquiry into the growth of the camera safari business that interest in wildlife watching is increasing.

In 1975, the federal government conducted a national survey of hunting, fishing, and wildlife-associated recreation (U.S. Fish and Wildlife Service, 1977). It had been preceded at 5-year intervals by similar, though less comprehensive, surveys (U.S. Bureau of Sport Fisheries and Wildlife, 1961, 1966, 1971). The surveys produced evidence that about 4.8 million Americans, 9 years of age or older, photographed wildlife in 1970 and about 14.9 million did so in 1975. (Although one may question that participation in wildlife photography increased threefold in only 5 years, it presumably did increase at some lively rate.)
Moreover, the Fish and Wildlife Service has been making in recent years an internal survey estimating the reasons why people visit the national wildlife refuges which the Service administers. On an annual average basis, for the years 1973 through 1977, about 12.6 million (63%) of the refuge visitors were intent on "recreation, wildlife, nonconsumptive," while 7.6 million (38%) were intent on "recreation, wildlife, consumptive" (personal communication, 1979).

While interest in benign uses of wildlife has been growing, interest in sport hunting, a consumptive use deeply rooted in American culture, has been declining. Returns from the above-mentioned federal surveys indicate that in 1965 there were 13.6 million hunters 12 years of age or older, representing 9.6% of the comparable population (141.9 million). In 1975, there were 20.6 million hunters 9 years of age or older, representing 9.6% of the all-age population (214 million). Because the sampling bases were different in 1965 and 1975, the results cannot be compared. They strongly indicate, however, that the percentage of hunters decreased between 1965 and 1975. Reiger (1978) agrees that "although there are more hunters than ever before in the United States...they represent a declining percentage of the overall population."

Two main factors, I think, have been responsible for the fading importance of sport hunting: decrease in area of wildlife habitats and increase in anti-hunting sentiment.

Natural wildlife habitats are daily being lost to farmlands, suburbs, reservoirs, highways, marinas, and other engineered environments. The National Wildlife Federation (1974) once estimated the rate of loss at more than one million acres a year. McCormick places the destructive loss of wetlands alone (i.e., areas rich in waterfowl and aquatic furbearers) at 0.5 to 1% a year (in Good et al., 1978). As a consequence, hunting and trapping have become less rewarding and less attractive.

Anti-hunting sentiment is more difficult to measure. In 1975, the National Shooting Sports Foundation hired a major New York research agency to determine public attitudes toward hunting and hunters (Rohlfing, 1978). After interviewing people in five key cities, the agency concluded that anti-hunting sentiment is based on three main grievances:

(1) Hunting results in animals being wounded and becoming crippled or dying a slow agonizing death. (2) The typical hunter is untrained and incompetent, possessing neither skills nor a knowledge of the basic rules of his sport, and therefore is dangerous to protected species, himself and others. (3) The hunter often behaves without regard for laws, rules, regulations or the rights of others. (Rohlfing, 1978).

I have dwelt on the decline of sport hunting because I believe that it is linked with the growth of interest in wildlife watching. One activity is displacing the other. Many Americans who find sport hunting unattractive for one reason or another are turning to benign uses of wild animals as an alternative.

Camera Safaris

The past two decades have seen a sharp rise in the number of camera safaris,
or programmed tours offering close-up views of wild animals. New leisure time and cheaper means of travel have opened opportunities for people to visit parks, wildlife refuges, seashores, and similar places where animals can be seen and enjoyed. Camera safaris grade imperceptibly from the serious or educational to the purely recreational. A few offer professional instruction in the special techniques of ornithology, entomology, wildlife photography, or drawing and painting from nature. Camera safaris sponsored by colleges usually offer credit.

To estimate the growth of the camera safari business in recent years, 26 travel agencies advertising in the United States were questioned for the kinds of information shown in Table 1. No agency was asked about the number of tourists it served nor the dollar importance of its business. Sixteen agencies replied. During 7 recent years, the number of safaris increased at a mean annual rate of 32%.

**TABLE 1.**

Increase in Number of Camera Safaris as Reported by 16 Travel Agencies\(^{(1)}\)

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base year (BY)(^{(2)})</td>
<td>1957-1978</td>
<td>1970.7</td>
</tr>
<tr>
<td>Recent year (RY)(^{(3)})</td>
<td>1977-1978</td>
<td>1977.9</td>
</tr>
<tr>
<td>Study period (RY-BY), years</td>
<td>1-21</td>
<td>7.2</td>
</tr>
<tr>
<td>Number of safaris in base year</td>
<td>1-23</td>
<td>6.28</td>
</tr>
<tr>
<td>Number of safaris in recent year</td>
<td>3-316</td>
<td>44.37</td>
</tr>
</tbody>
</table>

Annual growth rate, percent 32

\(^{(1)}\)Agencies advertising in the United States.

\(^{(2)}\)Year when agency conducted its first safari.

\(^{(3)}\)Year 1978 for 15 agencies, 1977 for one.

**Impact of Tourism**

Rapid expansion of the camera safari business has brought with it the problem of getting people quietly and unobtrusively into the haunts of wild animals. Although the problem deserves fuller treatment than given here, I offer three case histories based on personal experience.

Along the Skagit River in Washington state, several hundred bald eagles gather each winter to feed on the spawned-out carcasses of salmon (Nature Conservancy, 1976). Eagle-watchers observe them from the riverbanks or from drift boats piloted by professional guides. In recent years, the number of eagle watchers has increased to the point where some wildlife managers now fear the birds may desert the river. Stalmaster and Newman (1978) recommend “reduced human interferences, creation of vegetation buffer zones, and establishment of
activity restriction zones” for the wintering grounds.

On a camera safari in 1973 to Laguna Ojo de Liebre, Baja California, one of the shallow inland Mexican seas where gray whales breed in winter, biologist Karl W. Kenyon and I made a special point of estimating the effects of tourism on the wildlife of that region. (The Mexican government had already closed the upper reaches of the Laguna to whale-watching parties as of 13 February 1972; we were not allowed to enter the waters where most of the whales gather.) We later concluded that the tourists of all the camera safaris (about 30) into the Laguna that winter harassed at least 4,480 whales. Kenyon declared that an elephant seal population of Isla Guadalupe (offshore from the Laguna) which he had photographed eight years earlier had decreased to one-third its former size by 1973. By repeatedly frightening California sea lions off the beaches of Isla Benito del Centro over the eight-year period, tourists had cleared the island entirely of that species. The harbor seals of Isla San Martin were threatened. We watched pups, under a week old and barely able to float, trying to follow alarmed older animals into the open sea, and later counted 13 pups, 4 already dead.

In February 1979, I revisited Baja California — this time to Bahia Magdalena — on a whale-watching tour sponsored by the American Cetacean Society. The Mexican small boat operators who took us among the mating and nursing whales were keenly sensitive to the danger of disturbing them. They accepted the necessity of approaching the whales quietly and of viewing them from afar, despite the dampening effect of that technique upon thrill-seeking members of our party. The tour sponsor had provided a large anchored raft, complete with toilet and sleeping facilities, from which one could unobtrusively photograph passing whales or record their underwater voices.

Further references to the impact of tourism upon wildlife can be found in Crittendon (1975), Hudnall (1978), Jones (1966), Mountfort (1975), and Reiger (1978a).

Growth of Animal-Interest Organizations

Since the late 1960's, in the modern period which has been called the Age of Environmental Awareness, Americans have been displaying heightened concern for the conservation of wild animals. In increasing numbers they are joining animal-interest organizations. Their motivations include interest in the preservation of vanishing wildlife habitats and endangered species, especially the popular forms such as whales, seals, wolves, eagles, and falcons, and growing moral concern for the welfare of animals. Moreover, an obvious factor in the growth of certain animal-interest organizations is their employment of modern big-business methods, including nationwide advertising, mail soliciting, and the publishing of quality newsletters, brochures and manuals.

In an attempt to measure, albeit crudely, the growth of animal-interest groups, 20 national organizations, each having at least 1,000 members or supporters and each professing an interest in wildlife conservation, were questioned. Fifteen responded with useful data (Table 2). The organizations represent a wide range of animal interests, from hunting and trapping to zoo management and humane treatment. During a study period which varied with the organization and averaged 15.3 years, membership increased at a mean annual rate of 7.7%.
**Table 2.**

Increase in Membership as Reported by 15 Animal-Interest Organizations\(^{(1)}\)

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base year (BY)(^{(2)})</td>
<td>1938-1971</td>
<td>1962.8</td>
</tr>
<tr>
<td>Recent year (RY)(^{(3)})</td>
<td>1978-1979</td>
<td>1978.1</td>
</tr>
<tr>
<td>Study period (RY-BY), years</td>
<td>8-40</td>
<td>15.3</td>
</tr>
<tr>
<td>Membership in base year, thousands</td>
<td>0.2-1,833</td>
<td>130.1</td>
</tr>
<tr>
<td>Membership in recent year, thousands</td>
<td>1.4-4,525</td>
<td>376.4</td>
</tr>
</tbody>
</table>

Annual growth rate, percent 7.7

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\(^1\)Nation-wide organizations in the United States having at least 1,000 members or supporters and professing an interest in wild animal conservation; data from personal inquiries, from Scheffer (1974:186; 1976:51), and from National Wildlife Foundation (1979).

\(^2\)Founding year of the organization ranges from 1905 to 1970 (mean 1954). Each organization provided a “base year” membership figure for some year near 1960, except that organizations founded post-1960 provided a figure for some early year post-1960.

\(^3\)Year 1978 for 13 organizations, 1979 for 2.

Although the data of Table 2 indicate a surge of interest in the preservation of wild animals, one may ask what they reveal about community attitudes toward uses of animals. To what extent do they reflect public taste? At first glance, very little. When, however, one compares them with the figures presented earlier on the decline of sport hunting, an activity which until lately represented the most important use of wildlife in America, one can reasonably conclude that the growth of animal-interest organizations is largely the result of new interest in benign uses of wildlife.

**Growth of Interest in Animal Rights**

Interest in animal rights is expanding more rapidly than anyone could have imagined ten years ago. And, in conceding rights to animals, people tend to question the necessity — indeed the morality — of many traditional uses of wildlife species. Charles S. Elton of Oxford, pioneer ecologist, once wrote that “the first [reason for conservation], which is not usually put first is really religious. There are some millions of people in the world who think that animals have a right to exist and be left alone” (Elton, 1958). New books dealing with animal rights are appearing at a lively rate (e.g., Hutchings and Caver, 1970; Singer, 1975; Regan and Singer, 1976; Clark, 1977; Morris and Fox, 1978; Leavitt et al., 1978).

The startling notion that animals may have the legal right to sue for damages was proposed by Christopher D. Stone in 1972 (Stone, 1975 and 1976; Steinhart,

In 1978, in Paris, the International League for Animal Rights (I.L.A.R.) offered its Universal Declaration of the Rights of Animals (or Animal Charter) to the United Nations Educational, Scientific and Cultural Organization (I.L.A.R., 1978). Because of UNESCO's rules, which specify that any document offered to it by an outside group must be presented by a member state of that group, UNESCO could not accept the declaration. Public backing for it, however, was obviously great; it was accompanied by more than two million signatures gathered from around the world.

The declaration reflects concern both for humane treatment and benign use of animals. It declares that "all animals are born with an equal claim on life and the same rights to existence. They deserve the right to liberty in their natural environment [and where] living traditionally in a human environment have the right to live and grow at the rhythm and under the conditions of life and freedom peculiar to their species." It concludes that "the rights of animals, like human rights, should enjoy the protection of law" (I.L.A.R., 1978).

Not everyone agrees. The Washington Star (1978) notes editorially that "anything so inconsistent as the Animal Charter, so sentimental in what it asserts, so false in what it ignores and so clearly out of proportion to the way things are in human society, becomes a mockery of benevolence, indeed of ethics."

According to philosophers Miller and Williams (1979), widespread belief in animal rights is the consequence of four factors working in our society: new knowledge that humans can communicate with nonhumans in what is close to language; the abortion controversy, which has forced us to ask what a 'person' is; the suspicion that nonhumans can reason (cf. Griffin, 1976); and "a group of discoveries and trends in the biological sciences, including sociobiology and ethology, which attempt to draw conclusions about human social patterns from the behavior of other species."

**Conclusion**

Americans are turning to benign, or nonexploitive, uses of wild animals, less because exploitable species are becoming harder to find than because public sentiment is growing in the direction of greater respect for animals. Community opinion as to which uses of animals are 'right' and which are 'wrong' is being expressed in the language of national law. Community opinion is rooted not only in the soil of science, technology, and economics but in the soil of pure intuition. It grows, in the words of Russell W. Peterson (1978), "for reasons beyond logic or perceived self-interest."

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Livestock Behavior as Related to Handling Facilities Design

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Abstract

A knowledge of the behavior of different species of livestock as well as different breeds within a particular species is essential to the proper planning of a handling facility. An optimal facility should incorporate features which minimize stress on the animal and maximize the efficiency of movement from holding pen to slaughter area. Handler awareness of the animals' perception of critical distance, flight zone and personal space requirements also reduces problems with balking and alarm behavior. Many improvements can be made with relative ease, thus enabling already existing facilities to upgrade their operations.

Introduction

The breed of animal, its degree of tameness and the type of environment in which the animal is raised can affect its behavior and ease of handling at the slaughter facility. For example, animals which have been raised on the range and away from people will have a larger 'flight zone' and may panic and become agitated when a handler approaches within 50 feet (15m). Animals which have been raised in close confinement on either solid concrete or slatted floors can also be difficult to handle on occasion. It is, therefore, essential to assess all the behavioral aspects of different species of livestock when designing slaughter handling facilities.

Breed and Behavior

Cattle

Cattle with Brahman or Zebu breeding are more excitable and harder to handle than English breeds such as Hereford and Angus. Brahman type cattle (Bos indicus) are more difficult to block at gates (Tulloh, 1961) and tend to become excited and ram fences. Agitation in Brahman cattle is readily displayed by tail swishing; the excited animal will stand its tail straight up (Kiley, 1976). Angus breed cattle are more nervous than Herefords or Shorthorn (Bos taurus), but they also have the tendency to be stubborn and refuse to move (Tulloh, 1961). Holstein cattle tend to move slowly.
The Brahman cross and Brahman type cattle can become so stressed and disturbed that they will lie down and become immobile. Brahmans have been observed lying down in the single file leadup chute, particularly after being prodded repeatedly with electric prods (Fraser, 1960). When a Brahman lies down and becomes submissive, the animal must be left alone for about five minutes; otherwise, it may go into shock and die. This problem rarely occurs in English cattle or in other European cattle such as the French Charolais.

**Pigs**

Social and sensitive by nature, pigs respond to gentle and considerate handling. However, this may not always be the case in pigs which have been raised in close confinement on either solid concrete or slatted floors. Confinement-raised hogs tend to be more balky, have trouble negotiating obstacles and are difficult to drive because they are not acclimated to walking and moving. Such pigs, therefore, must be moved slowly to prevent them from becoming overheated and stressed. In Europe, confinement-raised hogs are moved with a trolley which slowly nudges them along rather than with a handler who drives the hogs down the alley.

**Sheep**

There are distinct differences in the way various breeds of sheep react during handling (Shupe, 1978; Whateley et al., 1974). According to Shupe (1978), Ram-bouillet sheep tend to bunch tightly together and remain in the group, while crossbred Finn sheep tend to turn, face the handler, and maintain visual contact. However, if the handler penetrates the collective flight zone of a group of Finn Sheep, they will turn and run past the handler (Shupe, 1978).

Extensive studies reported by Whateley et al., (1974) indicate that Cheviots and Perendales are the easiest to drive into a crowding pen, and that Romney, Merino-Romney cross and Dorset-Romney cross are the most difficult. The Romney tends to follow the leader but is easily led into blind corners; the Cheviots have a strong instinct to maintain visual contact with the handler and display more independent movements than other breeds.

**Visual Perception and Behavior**

**Visual Field**

The visual perception of livestock is a major factor in the design of handling facilities. Cattle and sheep have 360° panoramic vision, a binocular visual field of 25° to 50° and relatively poor depth perception (Prince, 1970). Swine have a wide angle 310° visual field, a binocular visual field of 30° to 50°, and are better able to judge distances (Prince, 1970). The wide angle vision of cattle, sheep and swine suggests that single file lead up chutes, crowding pens, and the curved holding lane should have high solid sides to prevent the animals from seeing moving objects and people outside the facility, especially where animals are crowded (Rider et al., 1974; Grandin, 1977).

**Color Discrimination**

Until recently, many researchers believed that livestock were unable to dis-
Cattle have panoramic vision, as shown in this drawing. The area covered by the coarse concentric circles represents the animal's field of vision in which it has no depth perception. The small shaded area in front of the animal's head represents its binocular field. It has depth perception in this 25 to 50 degree area.

tinguish colors and viewed their environment in gradations of gray. However, Hebel and Sambraus (1976) reported complete color vision in swine and partial color blindness in herbivores such as cattle and sheep. Color discrimination tests conducted on 18 month old Friesian heifers showed that the animals had discrimination for all colors except blue and purple; however, orange and yellow were confused (Thines and Soffie, 1977). In a study conducted by Webb (1966), cattle approached yellow lights more readily than other colors, and exhibited no reaction to infrared lamps.

Visual Perception, Lighting and Floor Design
The wide angle vision and poor depth perception of livestock partially ac-
counts for the animals' reluctance to cross shadows, drain grates and other high contrast objects. Lighting and flooring are, therefore, important elements to consider in the design of livestock handling facilities.

Experiments conducted with pigs, sheep and cattle indicate that illumination should be even and diffuse (Lynch and Alexander, 1973; Ralph, 1975). Shadows and bright spots can cause all species of livestock to balk, although cattle and sheep are the most seriously affected (Kilgour, 1976a). Fig. 2 shows pigs

Fig. 2

Pigs avoiding shadows.
avoiding the shadow of fence rails. It has been observed in both cattle and sheep that the animals are reluctant to enter dark areas but will move toward an illuminated area (Kilgour, 1971; Shupe, 1978). The inside of a building should be well illuminated; however, bare light bulbs emitting harsh light should be avoided. Observations at large cattle handling facilities indicate that cattle are more easily forced into a dark building if the animals are lined up in single file before they pass into the building. In a slaughter plant where the cattle refused to enter the dark building from the bright daylit holding pen, the problem was solved by extending the single file lead up chute at least 15 ft (4.5 m) past the dark entrance out into the holding pens. This distance can be shortened for hogs or sheep.

Lynch and Alexander (1973) have suggested that livestock movements through a handling facility could be facilitated by illuminating areas in front of the cattle and darkening areas behind them. Since cattle will move towards the light in a darkened building (Ministry of Agriculture, 1957), a bright lamp installed over the stunning pen in beef slaughter plants can improve the accuracy of stunning. The light causes the animals to look up and thus hold their heads up. Stunning pen designs which allow light to shine under the discharge door at the floor level should be avoided as the cattle will almost always put their heads down toward the source of the light, making stunning very difficult.

Solid sunshades should be used in livestock handling areas to avoid the bright stripes of light on the ground. Slatted sunshades emit a zebra striped pattern of light which the animals will often refuse to cross. Alternating patterns of light and dark have such a strong deterrent effect on cattle that highway engineers in the western United States are able to prevent cattle from crossing highways by painting a series of stripes across the road, replacing the more expensive steel cattle guards. A livestock handling facility should be painted one solid color to avoid any disturbing contrasts, and stockyard drains should be placed where the animals will not have to cross over them. Sudden discontinuities in the floor level or texture are undesirable (Lynch and Alexander, 1973) and substantial downward slopes should be avoided in stockyards, crowding pens and single file chutes to the stunning area, especially in swine facilities (Kilgour, 1976b). However, a slight slope for drainage of 1/4 inch to the foot (2 cm perimeter) or less will not cause handling problems.

Cattle will often balk and refuse to pass under an overhead walkway or through a door if the entrance appears to be too low for their bodies. In one slaughter plant, cattle weighing 1000 lbs (450 kg) balked at the entrance door which was 6 ft (1.8 m) high. Taking photographs at the animal’s eye level is a useful way to assess shadow areas and other obstacles. The pictures will reveal and duplicate what the facilities may look like to an animal with poor depth perception.

Following Behavior

Following behavior in cattle and sheep is related to the animals’ strong instinct to maintain visual contact with each other (Kilgour, 1971). Cattle will stand at a 120° angle tangent to each other (Strickland, 1978); sheep will stand at 110° angle relative to each other (Crofton, 1958). This corresponds to the angle between the optic axis of the animals’ eyes.
A well designed facility should take advantage of the animals’ natural following tendency (Hafez et al., 1969). Cattle and sheep more readily enter a facility or move through a narrow chute if they can see the animal ahead (Ewbank, 1961; Ralph, 1975; Shupe, 1978). The strong following instinct in cattle may cause two animals to jam together at the entrance to a restrainer conveyor or at the transition point between the single file leadup chute and the crowding pen. It is, therefore, of utmost importance that there be a smooth transition between the crowding pen and the single file lead-up chute to prevent bunching and jamming. Since the following instinct is strongest in sheep, the use of a Judas goat or a trained sheep is recommended to lead the animals into the slaughter plant (Kilgour, 1976a; T. Grandin, personal observation).

Swine display a less pronounced following instinct, but will follow a leader when that leader is an established member of the social group. Meese and Ewbank (1973) stated, “...groups of pigs which had been previously established before introduction to the site showed a greater proportion of leadership resulting in the whole group following than did groups which were unacquainted before introduction to the site.”

Hafez et al. (1969) reported on a cattle study conducted by Beilharz and Mylrea in 1963 that “...leaders of forced movements were low in the dominance order, whereas, leaders of voluntary movements tended to have higher social rank.” Observations of cattle have indicated that the rough aggressive cattle tend to be the last animals to enter the single file lead-up chute from the crowding pen. Dove et al. (1974) reported that in Corriedale sheep the dominant members were farthest from the people during handling; the submissive sheep were the closest.

**Critical Distance**

Flight distance must be taken into consideration when cattle or sheep are being handled, although it is less important with pigs. Observations of cattle indicate that there is a ‘critical distance’ that a handler must maintain between himself and the cattle for the most effective movement. The critical distance is 5 feet (1.5 m) to 25 feet (7.61 m) for fattened cattle and up to 100 feet (30.5 m) for free-range cattle (Grandin, 1978a). Brahman breed cattle usually have a larger critical distance than English breeds.

The critical distance has been described as a “circle of safety” or flight zone around the animal (C. Williams, Livestock Consultant, personal communication). When a handler penetrates the flight zone the animal will move away. If the handler gets too close, the animal will turn back and run past the handler, or break and run from the handler. Conversely, when the handler retreats and moves out of the flight zone, the animal will stop moving. If the animals attempt to turn back, the handler should immediately retreat in order to increase the distance between himself and the animals before advancing again. Handlers should refrain from leaning over the single file shoot and deeply penetrating the animal’s flight zone. This is a major cause of animals rearing up and jumping out of the chute. An animal will attempt to maintain the critical distance at all times; thus for the most efficient movement of livestock, the handler should position himself on the boundary of the flight zone (Figs. 3 and 4).
Fig. 3

Handler positions for driving a single animal most efficiently.

Fig. 4

Handler positions for moving a group of cattle most efficiently along a fence.
Handling Groups

Groups of five to twenty head of cattle can be driven more easily with a minimum of excitement by a single handler if the handler is positioned at a 45° to 60° angle tangent to the shoulder of the leader rather than behind the animal (C. Williams, personal communication). When the handler, positioned on the boundary of the collective flight zone for the group, penetrates that boundary, both cattle and sheep will move in unison as each animal maintains visual contact with its neighbors. An experienced handler can keep a group of cattle moving by concentrating on moving the leaders.

Herd Behavior

Cattle and sheep are herd animals, and isolated individuals may become stressed and agitated (Ewbank, 1968). This is particularly a problem in Brahman type cattle. If a lone animal is left in the crowding pen after the other animals have entered the single file lead-up chute, it may attempt to jump the fence and rejoin its herd mates. The lone animal may also become agitated and attack the handler. The majority of serious handler injuries occur when a lone steer or heifer charges. When a group of cattle is being walked up to the plant and one of the animals turns back and runs past the handler, another two or three head should be allowed to go back with it. It will be much easier and much safer for the handler to bring up three head than to attempt to drive up a lone, frightened steer. Moreover, the handler must be cautious not to penetrate the animal’s flight zone too deeply, especially if it is cornered in a confined area such as a crowding pen. With all types of livestock following behavior can be used to increase efficiency, reduce stress and facilitate the flow of animals. However, following behavior can create problems where balky, hard to handle animals follow each other in the wrong direction.

Separation from the herd is extremely stressful for both cattle and sheep. Lynch and Alexander (1973) reported an increase in leucocytes in the milk of a dairy cow who was left locked in her stanchion after her herd mates had moved elsewhere. Sheep which were handled individually for shearing or became isolated exhibited stress through higher heart rates (Kilgour, 1976a; Kilgour and de Langen, 1970).

Equipment Design and Behavior

Solid Fences

Stockmen have learned from experience that all species of livestock can be handled more efficiently with less excitement and stress if all the areas where the animals are crowded have high solid sides which prevent them from seeing people and other moving objects outside the facility (Fig. 5). Nontransparent plastic or burlap also gives the appearance of a solid wall and thus discourages break-out attempts and balking (Burnell, 1967; Oelofse, 1970). Livestock should not be able to see under, over or through the fence in the single file lead-up chute, in the crowding pen or in the holding lane prior to entering the crowding pen. Sheep moved more rapidly through a chute which had solid sides (Hutson and Hitchcock, 1978).

The solid fence ensures that only the handler will enter the animal’s flight
zone and avoids a situation in which the animals are driven towards a visible person (Kilgour, 1976b; Ralph, 1975). The solid sides also prevent the animals from seeing highly reflective or flapping objects which may cause balking (Shupe, 1978).

Cable fence is not recommended for any type of livestock handling facility and should be used only for pens which house animals on the farm. Excited animals in a strange environment are unable to see cable fence and are likely to run into it and injure themselves. Therefore, installation of a belly rail is recommended so that animals can see the fence. Gates in cattle stockyards should be solid to prevent ramming by the animals, and the pens should be constructed from substantial pipe.

Solid fences are recommended in all areas where animals are crowded during movement to the stunning area. It has been observed in both pigs and cattle that if the animals moving in the drive alley can see other animals in the pens, they will tend to stop and sniff at each other through the fence (T. Grandin, personal observation). In stockyards or in drive alleys where animals will pass in the opposite direction, the fence between them should be solid and high enough to prevent the animals from seeing each other. In crowding pens for sheep, pigs or cattle, the crowding gate should also be solid; otherwise, the animals will turn and face the gate instead of the entrance of the single file lead-up chute. Kilgour (1976a) reported that advancing sheep will turn back if they see the sheep behind them. The solid crowding gate also prevents cattle or sheep from seeing light through the gate and turning towards it.
The principle of solid fences is akin to that of putting blinkers on a harness horse. The only thing the animals should see is the rear of the animal in front moving through the facility in the proper direction. However, animals must always be able to see a pathway of escape (Kilgour, 1976a). Livestock have often been observed refusing to enter a place which appears to be a dead end. Kilgour (1971) reported that cattle will stop 20 ft (6m) to 27 ft (8 m) from the end of a dead-end alley and sheep will stop at 10 ft (3m) to 14 ft (4m). Therefore, solid fences or gates are not recommended at the entrance to the single file lead-up chute. These sliding gates and one-way gates should be constructed so that the animals can see through them to enable an approaching animal to see another animal in front moving down the single file chute.

There is one exception to the rule of solid fences in the single file lead-up chute for all species of livestock. If two single file chutes are placed side by side, the fence in between should be constructed from bars to enable the animals to see through it (Fig. 6). The natural following behavior will increase the flow of livestock through the lead-up chutes. However, outer fences should be solid to prevent the animals from seeing people or moving objects outside the chute.

Fig. 6

Fences in two adjacent single file chutes are constructed from bars to facilitate following behavior. The outer fences should be solid.

Curved Chutes and Catwalks

A curved single file lead-up chute or wide curved holding lane is more efficient and minimizes excitement in all species of livestock (Grandin, 1977; Kilgour, 1971; McFarlane, 1976; Rider et al., 1974). The curved chute principle not only facilitates the natural following behavior of cattle and sheep but also has
the advantage of preventing the animals from seeing the stunning pen until they are about to enter.

Personal observations indicate that a curved single file lead-up chute or curved wide drive alley should have a catwalk along the inner radius. This enables the animal to maintain visual contact with the handler; it also facilitates the animal’s natural tendency to circle the handler. The catwalk should be alongside the fence rather than overhead to allow the animals to see the handler, especially in areas where animals are crowded. If the cattle or sheep cannot determine the location of the handler, they are more likely to scatter and mill around rather than move away from the handler in an orderly manner (C. Williams, personal communication). Where catwalks are required in the holding pen area for safety or insurance purposes (e.g. with wild cattle), they should also be installed alongside the fence lines.

Aroused Alarm Behavior
An excited animal often triggers a disturbance in a group which may be transmitted to all individuals (Crofton, 1958). Sheep form a more cohesive group than cattle and the entire flock may often react to a disturbance by bolting off to one side in a manner similar to a school of fish. Pigs will squeal an alarm call which triggers other pigs in the group to squeal and become agitated. A disturbance may be caused by inept handling procedures or by a shortcoming in facility design. For example, handling facilities must be sturdy and feel solid to the animals; restraining chutes or restrainer conveyors should have solid sides that do not give when the animal moves. Moreover, equipment should have simple controls which maximize the chance of restraining the animals on a first attempt (Ewbank, 1961, 1968). It has been found that if one animal balks and refuses to enter a squeeze chute restrainer, the next animal in line will have a greater tendency to do the same (Grandin, 1975). Hence, the disturbance appears to disrupt the following behavior of the animals. Therefore, livestock handling equipment which is designed with behavioral principles in mind can help minimize excitement and reduce stress in the animals.

Prods
An electric prod, when used properly, is probably less stressful and more efficient than having the handler yell at or hit the animals to make them move. Electric prods should be used only in the single file lead-up chute to the stunning pen or restrainer and not in the stockyard or pen area. The battery-operated prod, which uses several thousand volts and practically no amperage, is the safest. It has two contact points which produce a localized shock on the animal’s skin, causing the animal to move away from the shock. Livestock will often move readily when they hear the buzzing sound of a battery-operated prod without being touched by it due to prior conditioning on the farm or ranch.

In many slaughter plants, electric prods are wired to a fence charger or some other electrical source. One disadvantage of this type of system is that in order for the animal to feel the prod, the current has to ground out through its feet instead of passing through the two contact points on the skin. If the animal is wet, the current tends to make the animal tingle all over, thus blocking the directional stimulus.
The advantage of wired systems is that there are no batteries to replace. However, wiring the prods directly to house current (115 volts AC) is totally unacceptable. Wiring in a resistor such as a light bulb is also hazardous not only to the animals but also to people. If an animal bellows or squeals when touched by the prod, too much current is being applied and a step-down transformer should be used. In permanently wired prods, the voltage between the end of the prod and a perfect ground should not exceed 50 volts AC. The best prods use a transistorized power source of 5000 or more volts with less than 20 milliamps of current. The best tool for handling hogs in the stockyards and crowding pen is a canvass slapper, while cattle will move readily in response to a waving piece of plastic.

Handlers commonly make the mistake of prodding an animal when it has no place to go. When an animal balks after it has been prodded up to a closed gate, it will be more likely to balk when it is prodded up to the stunning pen or restrainer after the gate is opened. Inexperienced handlers often find it difficult to refrain from poking at livestock and are constantly prodding the animals to make them move up to the head of the line or to move less than an animal’s length. This tends to make the animals balky or stubborn. A smoother flow is achieved if the handler waits until the single file lead-up chute has enough room for at least five animals before attempting to fill it from the crowding pen. This facilitates the animal’s natural tendency to follow the leader. If the handler attempts to put only one animal in the single file lead-up chute at a time, the flow will be uneven and animals will tend to turn back and mill around the crowding pen. This principle applies to all species.

Electric prods should never be used to make animals back up. Prodding any type of livestock on the head or nose in an attempt to make the animal move in reverse will usually result in the animal leaping over the one in front of it. However, cattle and sheep can be backed up in the single file chute by a tap on the nose.

Pen Dimensions and Behavior

Social Hierarchy

All species of livestock have a social hierarchy of dominant and subordinate animals (Hafez and Bouissou, 1975; Albright, 1976). Dominance hierarchies reduce conflict and establish an order for access to resting places, water and feed (Albright, 1976). When strange groups of cattle or swine are mixed together, the animals will fight to determine the status of each animal in the group from the most aggressive (dominant) to the most timid (submissive) animal (Symoens and Van den Brande, 1969). Unlike cattle and pigs, sheep do not fight to establish a dominance order, although they do become stressed when mixed with strangers and will not integrate into a flock for weeks (Kilgour, 1976a; Winfield and Mullaney, 1973). Kilgour (1976a) states, “Though sheep will not fight, they will remain a separate entity even in small enclosures.”

Conflicts which lead to fighting and stress can be avoided by keeping animals that have been raised together and, hence recognize each other, housed together in separate pens. However, further research is needed to determine the optimal number of animals to place in each pen. The group has to be small enough so that the animals can recognize each other and maintain hierarchical
relationships. Forty to 50 head of large steer appears to be a reasonably sized group to pen together (T. Grandin, personal observation).

Swine stockyards should be large enough to hold pigs from either three or four farms or small enough to hold a truckload from one farm. There tends to be more fighting among pigs mixed together from only two farms. Pigs housed together from ‘multi’ or ‘single’ farms tend to fight less than the ‘two farm’ pigs, although the question of how stressed the pigs are even with less fighting still needs to be answered.

Long, Narrow Pens

Research conducted on the social hierarchy of livestock indicates that the shape of a pen may be as important in reducing stress as the amount of floor space which is allotted to each animal (Kilgour, 1976b). Livestock which can spread out to increase the distance between individuals and accommodate their need for personal space are less likely to be stressed (Kilgour, 1976b). The concept of personal space has been described by Strickland (1978) as “a bubble-like force field which surrounds the animal. It may be thought of as a space-helmet type phenomenon which also exists in humans.” When another individual gets too close, an animal will move away to prevent its personal space from being violated.

Observations on all species of livestock indicate that the animals have a more acute sense of personal space when standing or lying around the perimeter of a holding pen (Strickland, 1978). Pigs will actually fight over a spot near a fence when the entire center portion of a large pen is empty (T. Grandin, personal observation). Moreover, cattle prefer to stand or lie around the perimeter of a pen even when the sides of the pen are covered with plywood to prevent the animals from seeing out (Strickland, 1975).

Strickland (1975) compared square, round, triangular and rectangular pens and the relationship between floor area and the length of the perimeter fence. A triangle has a higher ratio of perimeter:area than a square, and a circle has the lowest perimeter:area ratio. The long, narrow rectangular pen has the largest amount of perimeter fence in relation to floor space. A 12 ft (3.5 m) x 80 ft (23.5 m) long, narrow pen has 960 sq ft (82.25 sq m) and a total of 184 lineal ft (52 m) of perimeter fence. A 31 ft (9.15 m) x 31 ft (9.15 m) square pen of approximately the same area has only 124 lineal ft (36.6 m) of perimeter fence. In a 12 ft (3.5 m) x 80 ft (23.5 m) long narrow holding pen, 18 animals would have at least 10 ft (3 m) of perimeter fence per animal, while in a square pen with the same amount of floor space, each animal would have less than 7 ft (2.1 m) of perimeter fence. Thus, a long, narrow pen more readily facilitates the ‘personal space’ requirement of livestock and reduces the incidence of fighting (Grandin, 1978a; Strickland, 1978).

Less fighting occurred among dairy cows when the feed bunks were placed along the perimeter fences instead of in the middle of the pen (C.W. Arave, Utah St. Univ., personal communication). Kilgour (1976b) also reported that oblong-shaped pens were superior to square pens for housing bulls. In a study conducted by Grandin (1978b), one group of steers placed in a long narrow pen 24 hours prior to slaughter had fewer dark-cutting carcasses than cattle placed in a square pen. When animals fight prior to slaughter, the incidence of dark-cutting beef or pale, soft exudative pork can increase (Grandin, 1978b). The animals in
the large square pen also appeared to be more active, presumably due to the larger amount of floor space per animal.

Long narrow pens are also a good design for slaughter plant holding pens because they facilitate one-way traffic flow and handling. Fig. 7 illustrates long narrow pens which have been built on a 60° angle to eliminate the 90° corner. Animals enter through one end and exit through the other.

Fig. 7
Long narrow diagonal pens for holding cattle.

**Round Pens**

The round pen system has been widely used for capturing wild horses in the western United States, capturing wild animals in Africa and handling large groups of sheep and cattle in Australia (Daly, 1970; Diack, 1974; Grandin, 1978c; Taber and Cowan, 1971; Ward, 1958). Round pens allow an excited animal to run in a circle without pile-ups in corners. The reduced length of perimeter fence in relation to the floor area in a round pen is an advantage for crowding pens which are used to direct the livestock to enter the single file cute to the stunning area. In a round crowding pen the animals tend to stay together in a cohesive group and circle instead of spreading out along a fence. The round crowding pen also takes advantage of the animal’s natural tendency to circle the handler. Thus, the handler can move the livestock with less excitement, thereby reducing stress in the animals.

Round pens should not be used where animals are waiting prior to slaughter after they have been unloaded from the trucks. Animals in the holding pen need the security of an enclosure with a longer fence line where they can have their personal space.
Behavioral Responses to Sound and Odor

Hearing/Sound

Excessive noise can be stressful to livestock as well as to people working in slaughter plants and stockyards. The National Institute of Occupational Safety and Health (NIOSH) [1978] recommends 85 dB as the maximum level of noise per 8-hours for people. The current allowable noise level in factories for eight hour exposure is 90 dB. Louder noises can be tolerated for shorter periods of time. Table 1 gives the decibel readings for common sounds. Cattle and sheep are more sensitive to high frequency sounds than humans. Studies indicate that the auditory sensitivity of cattle is greatest at 8000 Hz, while in sheep the greatest auditory sensitivity is at 7000 Hz (Ames, 1974). The human ear is most sensitive at 1000 to 3000 Hz.

TABLE 1

Sound Levels from Familiar Sources

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<td>125 dB</td>
<td>Jet takeoff at 200 ft. (60m)</td>
</tr>
<tr>
<td>120 dB</td>
<td>Thunder</td>
</tr>
<tr>
<td>100 dB</td>
<td>Boiler shop or electric furnace in steel mill</td>
</tr>
<tr>
<td>90 dB</td>
<td>Subway train at 20 ft. (60m)</td>
</tr>
<tr>
<td>80 dB</td>
<td>Pneumatic drill at 50 ft. (15m)</td>
</tr>
<tr>
<td>70 dB</td>
<td>Vacuum cleaner at 10 ft. (3m)</td>
</tr>
<tr>
<td>65 dB</td>
<td>Speech at 1 ft. (0.3m)</td>
</tr>
<tr>
<td>50 dB</td>
<td>Light traffic 100 ft. (30m)</td>
</tr>
<tr>
<td>40 dB</td>
<td>Minimum level in city residential areas at night</td>
</tr>
<tr>
<td>30 dB</td>
<td>Soft whisper at 5 ft. (1.5m)</td>
</tr>
<tr>
<td>20 dB</td>
<td>Studio for sound recording</td>
</tr>
<tr>
<td>0 dB</td>
<td>Youth hearing threshold</td>
</tr>
</tbody>
</table>

This chart is based on sound measurements taken using the A frequency weighting function. The A-weighted sound level scale is the most commonly used for noise measurement (Lipscomb 1978). The decibel scale is logarithmic (does not increase in a linear fashion).

Sudden, loud ‘impact type’ sounds are particularly stressful and frightening to animals. Ames (1974) exposed sheep to three different types of sound at 75 dB or 100 dB. The sounds were white noise (a static hiss), instrumental music, and
miscellaneous noises of roller coasters, trains and fog horns. Sheep exposed to the 75 dB levels gained weight faster during a feed trial than either the controls or the sheep exposed to 100 dB. The heart rate in sheep during exposure to the instrumental music was significantly lower than the heart rate in sheep exposed to white noise or the miscellaneous sounds, suggesting that soothing sounds reduce stress. The animals exposed to 100 dB appeared more stressed and had the lowest weight gains.

In a study conducted by Webb (1966), a boar exposed to a 120 dB recording of a thunderstorm crouched down, quivered and refused to move. Falconer and Hetzel (1964) reported that the sound of exploding firecrackers and barking dogs caused visible fright and an increased level of thyroid hormone in sheep.

Sudden noises that alarm or frighten the animal will usually result in alterations in heart beat (Ames, 1974). The ring of a loud outdoor telephone bell, for example, raised a calf's heart rate from 50 to 70 beats per minute (T. Camp, USDA Experimental Station, College Station, TX., personal communication).

Soft background music is recommended for all types of livestock in the stockyards, while the volume should be increased as the animals approach the noisy equipment in the stunning area. A large beef slaughter plant in the southwestern United States installed a music system which played throughout the stockyard and stunning area. The music was just barely audible over the noise of the plant machinery which registered approximately 90 dB. The cattle heard music from the time they were unloaded from the trucks until they were stunned. Observations in the plant indicate that the cattle appeared to be calm when the music was playing, but that handling problems with balky or excited cattle occurred when the music system was not working. The plant slaughtered large numbers of Brahman and Brahman cross type cattle which tend to be more nervous and excitable than English cattle. Plant employees speculated that the music sounded familiar to the cattle as they moved from the stockyards to the stunning areas and as a consequence reduced fear. Another benefit of the music system is that it provides a better environment for the people working in the stockyards and in the plant. The employees enjoyed the music and appeared to have a more positive attitude toward their jobs. This in turn helps to prevent the employees from venting their frustrations through abuse of the animals.

Cattle appear to prefer instrumental music to loud rock and roll (Webb, 1966). However, in pig slaughter, Kilgour (1978) suggests a noisy environment to prevent the alarm call squeal of one pig from creating a disturbance throughout the entire group. Pigs are very vocal animals and communicate vocally to each other. Hence, the use of loud music may help mask alarm squeals. Pigs could perhaps remain calmer by listening to tape recorded grunts of contentment throughout the restrainer and stunning areas. There is, however, a level where noise probably becomes stressful to pigs.

In cattle and sheep slaughter plants, noise should be minimized wherever possible. Balky cattle will refuse to move or will move away from noisy equipment. Lambs are also stressed by noise, but they will usually not move away from the source. Webb (1966) reported that Shropshire sheep appeared to be agitated by loud 120 dB noises of many types, but they would not move. Cattle moved away more readily from sounds which were pulsed two to four times per second than from a steady tone (Webb, 1966). Pigs, however, remained still and did not
move away from the source of a pulsed tone at 120 dB.

All types of livestock react negatively to the sound of people yelling. A skilled, quiet handler who makes only a small “ssshh” noise can move more livestock per hour than a handler who yells. Yelling at cattle has the same effect as penetrating the animal’s flight zone too deeply (C. Williams, personal communication).

There are many areas in the slaughter plant and in the stockyards where noisy equipment should be silenced to reduce handling problems. In a study conducted by Grandin (1975), a motor driving a hydraulically actuated squeeze chute in a feedlot was located directly in front of the chute. As a steer entered the chute, it had to walk directly toward the noisy motor. Fifty percent of the cattle refused to enter the chute after one prod. When the motor was moved to one side, the incidence of balk ing dropped to 32%. Hydraulic equipment can also be engineered for sound reduction. All air operated equipment should be checked for leaks and supplied with mufflers.

Air leaks can cause balk ing problems. At one slaughter plant, cattle were observed refusing to walk past a certain point in the main drive alley due to a leak in an air line. At another plant, the air valve which operated the tail gate on the stunning pen hissed when the gate opened, causing the animal to back up in the single file lead-up chute. It is of the utmost importance that a stream of air from a valve does not blast in an approaching animal’s face. This will cause nearly 100% balk ing. The exhausts from hand air valves and solenoid valves should be piped outside if possible.

One-way gates in the single file lead-up chute should be counterweighted to close gently after the animal walks through. If the gate makes a loud clanging noise, the next animal in line will usually attempt to back up. Padding the stops on the gates with rubber prevents the noise of metal hitting metal. Shackle chain returns should also be equipped with rubber bumpers to reduce the sound of clanging metal. These modifications also prolong the life of the equipment.

Noise appears to be a major problem in all steel construction for livestock handling facilities. However, one advantage of steel construction is that changes or modifications to a steel chute or pen are easily made. Single file lead-up chutes and crowding pens constructed of concrete are quieter, rustproof and better suited to plants that have no plans to modify the facility after it is built. Concrete or steel is recommended over wood for most new facilities. Proper construction, such as welded rather than bolted plates and sheets embedded in concrete can eliminate some of the noise. Coating metal with sound-damping material is also effective, but may be costly and require extra maintenance.

**Smell**

The sense of smell seems to be particularly acute in cattle. The smell of blood appears to disturb cattle, and they will often refuse to enter a stunning pen if there is blood on the floor. Keeping the blood washed out reduces problems with balky cattle. Cattle displayed a greater incidence of balk ing and refusing to enter a squeeze chute when an animal was being castrated (Grandin, 1975). The following animal stopped before entering the squeeze chute and sniffed the blood which had dripped on the floor. Slaughter plant employees report that cattle are often balky and refuse to enter the plant when the wind is blowing odors.
from the plant toward the stockyards. (It may be that the unfamiliar odors cause the cattle to refuse to approach the source of the smell.) Sheep may also be disturbed by slaughter plant odors, but pigs appear not to be affected by either the smell or sight of blood and have been observed both eating blood and wallowing in it.

Some of the handling problems caused by the smell of blood and other slaughter plant odors could be reduced by designing ventilation systems which direct the odors away from incoming cattle. When a new plant is designed, the rendering plant should be located as far away from the stockyard as possible. Air curtains can also be used to block or divert odors.

**Conclusions**

Many of the recommendations in this review are relatively obvious, but it is clear that numerous slaughter plants either do not follow optimal handling practices or suffer from shortcomings in construction. Points which should be included in the planning of any new facility, or upgrading of existing facilities, are: 1) breeds to be handled; 2) visual factors; 3) pen construction; 4) chute construction; 5) handler training; 6) noise levels and types; and 7) odors. The answers cannot always be determined by reference to common sense, and more attention should be paid to research into some of these questions.

**References**


Horse Racing and Drug Abuse

The Humane Society of the United States (HSUS) and the American Horse Protection Association (AHPA) have drafted legislation to curb the abuse of drugs in horse racing. The bill, which will be introduced in the House by Representative Bruce Vento (D-Minn.) in early 1980, proposes the following:

1. Prohibition of all pre-race administration of medications capable of affecting a horse’s performance at the time of the race;
2. Prohibition of numbing an animal’s legs with ice, dry ice or any other chemical agent on the day of the race, and elimination of the practice of permanent numbing through surgical neurectomy;
3. Establishment of uniform pre-racing inspection and drug testing programs;
4. Strict enforcement of penalties for persons convicted of wrongfully drugging or numbing a racehorse.

Drug abuse in the horse racing industry is a complicated issue. States vary in their interpretations of the question of when legitimate use grades into manipulation for profit at the risk of both horse and jockey. For example, phenylbutazone (“bute”), a potent anti-inflammatory with significant beneficial properties, is routinely prescribed to reduce pain and restore some degree of function to arthritic or otherwise inflamed joints in horses. However, by relieving pain, phenylbutazone permits the racing of a horse on an injured limb, which not only prevents healing but also aggravates the condition. Deprived of the warning signal of pain, whether through medication or physical means such as numbing, an unsound horse can race, do itself further injury, and in the most serious cases, break down on the track. According to a study by sportswriter Russ Harris, on-track breakdowns at Philadelphia’s Keystone Racetrack increased 400% after the legalization of bute in Pennsylvania.

Other instances of drug abuse in horse racing involve the misapplication of a drug to mask disease or even confuse detection of illegal substances in the animal’s system. Furosemide (Lasix) is a diuretic prescribed for the relief of hypertension in humans. Several states allow furosemide to be used for treatment of nosebleeds in racehorses, although the Food and Drug Administration (FDA) has never approved the drug for this purpose. HSUS field investigator Marc Paulhus explained that “nosebleed” is a misleading term for epistaxis (pulmonary hemorrhage) induced by the stress of racing. Dr. George Maylin, of the Cornell University School of Veterinary Medicine, stated that in clinical trials, some, but not all “bleeders” respond to furosemide therapy. However, the exact pharmacological mechanism by which furosemide alleviates bleeding is unknown. Furosemide also increases urinary output, thus giving rise to the argument that administration of the drug leads to dilution of other chemicals (such as narcotics).
which may have been in the horse’s bloodstream to the point where they are undetectable in post-race testing. The proposed legislation aims to prevent such abuse primarily through federally mandated minimum standards for testing the blood and urine for horses before they race. As it stands now, most states (excluding New York, which has pre-race testing) test only the first three horses to cross the finish line. Drafters of the bill believe that the federal government can alter this situation by developing better, more specific testing programs to remove illegal pharmaceuticals from the track and put tighter reins on the widespread abuse of legal substances, a considerable array of which are currently available to the horse racing industry. [Ed. Note: On November 15, 1979, the Maryland Racing Commission imposed a ban on pre-race administration of all drugs, effective January 1, 1980. However, on December 19, it was announced that the ban would be postponed until March 15, 1980, and further that the use of lasix in confirmed bleeders would be allowed. Arkansas, New Jersey and New York regulations also prohibit pre-race medication, although New Jersey allows the use of Lasix for bleeders.]

UK Animal Experimentation

In 1876, the first legislative bill to regulate the use of animals in laboratory research was signed into law in Britain. Known as the Cruelty to Animals Act of 1876, a title which has continually disturbed researchers, it lays down conditions under which experiments causing pain to animals may be carried out. The Act specifies that potentially painful experimentation on vertebrates may be conducted only in registered facilities by persons holding an appropriate license from the Home Office. Licensed individuals may carry out experiments using anesthesia from which the animal must not be allowed to recover. However, experiments requiring recovery of the animal can be conducted if the license holder obtains an appropriate certificate. Simple procedures, such as inoculations and blood sampling, do not need certification.

When the Act passed, only a few hundred animals each year were used for experimentation in the UK, but the figure now exceeds five million per annum. (This does not include another estimated five million animals killed for their tissues or for sundry other purposes.) It has been frequently argued that the Act as written is no longer adequate in view of the dramatic increase in animal experimentation (J. Hampson, New Scientist 84:280, 1979). Protests by animal welfare organizations did lead to a Home Office departmental enquiry in the 1960’s under the chairmanship of Sir Sidney Littlewood. The Committee Report, published in 1965, put forward 83 recommendations for reform, some of which would have required new legislation. However, no action was taken on the recommendations resulting in a spate of private members’ bills during the late 60’s and early 70’s.

None of the private members’ bills (a device in British Parliament by which a few individual members selected by lottery can introduce bills on subjects of personal concern) was successful, although one bill introduced in 1972 by Mr. Douglas Houghton (now Lord Houghton of Sowerby) reached the final reading before being talked out. In essence, Houghton’s bill stipulated that “...no experiment on a living animal...” should be performed if the purpose could “...be achieved by alternative means not involving an experiment on a living animal.”

In 1976, animal welfare and anti-vivisection organizations in Britain came together in an effort to promote Animal Welfare Year. This collaboration bore fruit in the form of the
One of the Littlewood Committee members, Ms. Joyce Butler, accepted the Report on the grounds that the following three questions lay outside the Committee’s terms of reference:

a) Who can say whether, if certain biological tests were forbidden, satisfactory chemical or other methods of testing would not be developed.

b) Who is responsible for establishing whether modern medical techniques, with their emphasis on immunology and chemotherapy, both of which are inseparable from animal experimentation, are steering medicine in the right direction?

c) Who is responsible for moral and ethical judgements in the uses for experimental purposes as such?

The Littlewood group recommended that these questions be examined by an Advisory Committee to be constituted as a standing body with power to act on its own initiative.

In the meantime, two opposing bills on laboratory animal use are before Parliament. The first bill has the backing of the Research Defence Society, and was introduced by their president, Lord Halsbury. (The Research Defence Society was founded to counteract perceived antivivisectionist excesses and to inform the public of the value of animal experiments.) The second bill, introduced by Peter Fry, was reportedly sponsored by the Royal Society for the Prevention of Cruelty to Animals. However, a letter to New Scientist (84: 719, 1979) from Richard Ryder, Council Member of the RSPCA, denies sponsorship of the bill. Ryder argues that the Fry Bill is “not the animal welfare charter that it is being cracked up to be,” and states that it is therefore highly unlikely that the RSPCA Council “will be able to support a bill which in some respects promises to make the animals worse off than they are already.” Specifically, he claims that the bill fails to provide proper control over the infliction of pain, increased public accountability via a properly composed Advisory Committee, satisfactory constraints on researchers to use alternatives wherever possible, and restriction of live animal experimentation to worthwhile medical purposes. Ryder does, however, concede that the Fry Bill is preferable to the Halsbury Bill.

The Halsbury Laboratory Animal Protection Bill proposes a number of changes in the conduct of animal experiments. For example, the definition of the term ‘experiment’ will be broadened to cover all procedures in which animals are used. At present, ‘experiment’ does not include the production of antibodies, hormones, sera or vaccines. In addition, the Bill sets out specific conditions for the establishment of an Advisory Committee, empowers the Home Office to regulate the breeding, procurement and husbandry of laboratory animals, and requires the Home Office to publish a Guide to Good Laboratory Practice.

General Election Coordinating Committee for Animal Protection (GECCAP). In response to GECCAP activity, all three major British political parties included some statement on animal welfare in their election manifestos.

The pressure created by constituents, a combined animal welfare lobby, and European institutions such as the Council on Europe’s Expert Committee on Animal Protection has led to a pledge by Mrs. Thatcher that her government will update the 1876 Act.
The Fry Protection of Animals (Scientific Purposes) Bill in the House of Commons goes further than the Halsbury bill. The Fry bill insists that experiments be licensed only if they are “...for the advancement of biological sciences in a way which is calculated to lead to the saving or prolonging of life.” This means that research proposals will have to be justified by reference to medical benefits, a situation which, in the euphemistic words of Cambridge physiologist Lord Adrian, “...will make speculative research very difficult” (New Scientist 84: 501, 1979).

The Halsbury bill has fallen under fire from both animal welfare groups and the scientific community. The scientists’ complaints stem from the fact that the Research Defence Society rushed through the consultation process with representatives of the learned medical societies, leaving many of them without sufficient time to canvas members for their reactions. One defender of animal experiments, Professor Sam Shuster, is particularly disturbed about some of the provisions of the Halsbury bill. He believes that it will furnish an ideal opportunity for those “small of mind” to operate the system, thus choking creativity. Many researchers also fear the possible invasion of privacy implicit in the proposal to have two sponsors for license applicants — one to give a character reference and one to vouch for the procedures proposed.

Despite considerable opposition, the Halsbury and Fry bills have cleared two of the three hurdles in the respective Houses of Parliament. According to Member of Parliament Tam Dalyell, those MPs who intend to vote against the Fry bill may pause first to consider how much local animal welfare groups can stir up their constituencies. Thus, GECCAP continues to influence Parliamentary actions, even though the general election is long past and the Conservatives now have a comfortable majority. Tam Dalyell also argues that while some animals are used for important medical research, most end up in laboratories testing substances of little or no benefit to humanity, such as new cosmetics and cleaning fluids (New Scientist 84: 293-94, 1979). In fact, the most recent Home Office statistics on animal experiments (see News and Review — Lab Animals) reveal that the greatest number of animals are used in the development and testing of new drugs. However, even if the testing of household and cosmetic products does not statistically constitute a major demand for laboratory animals, significant suffering is involved in the Draize eye irritancy and LD50 testing. MPs are therefore questioning the honesty of claims that experimental animals do not suffer.

The increasing polarization of the scientific and animal welfare communities is perhaps inevitable, but unfortunate all the same. In 1875, the conflict created by two opposing bills led the government to establish a Royal Commission which may well have recommended against any legislation but for the evidence given by Dr. Klein, an Austrian physiologist who stated quite categorically that he only employed anesthetics for his own convenience, and that the feelings of his experimental animals were of no consequence whatsoever. In these enlightened times, another Dr. Klein is unlikely to appear. Instead, the Halsbury and Fry bills may be superseded by direct government action, possibly based on the Council of Europe’s draft Convention on the Protection of Laboratory Animals. According to Hampson, (New Scientist 84:280, 1979), “Any new legislation must be more than a mere sop to placate public opinion. It must be a
well thought out Act, brought into being as a result of extensive deliberation with all interested and informed parties, including the more responsible animal welfare representatives and the entire scientific community, which has not, to date, really been consulted. A new Act must be seen to exert real control while effecting no damage to legitimate scientific research. Such constraints will require a balancing trick of some considerable skill.”

**MEETINGS and ANNOUNCEMENTS**

**MEETING REPORTS**

**Charles River Symposium**

The Fourth Charles River International Symposium, entitled “Defining the Laboratory Animal and its Environment: Setting the Parameters,” was held October 29-31, 1979 in Danvers, Massachusetts. This was the first of the international meetings sponsored by the Charles River Foundation to be held in North America, and in these times, it was not surprising that relatively few participants came from overseas. However, the topic of the meeting was most appropriate for American laboratory animal scientists in view of current concern over the effects of new federal regulations on production, housing and use of laboratory animals in biomedical programs. According to remarks by some of the organizers, the meeting’s objectives included communication of state-of-the-art knowledge in various aspects of quality control as well as the stimulation of further research to determine whether current practices are, in fact, optimal for the animals.

The presentations covered a wide range of subjects, including production, transport, microbial contamination, quarantine, nutrition, housing, cage standards, and the effects of noise, lighting and chemical contaminants on the animals. At the end of the first two days, the audience was left with the impression that housing and maintenance of laboratory rodents involved so many confounding variables that it was difficult to see the possibility of duplicating, and hence verifying, any results at all. On the final day, Dr. W. Jean Dodds (New York State Department of Health, Albany) attempted to restore some perspective by questioning whether aseptic environments of porcelain, stainless steel and finely filtered air are indeed in the best interests of the animal and of good research. She did not imply that the answer was no, but did highlight the fact, which was by then obvious, that we still have a very hazy idea of what constitutes an optimal environment for the animal and the researcher.

During the discussion of temperature and ventilation standards, Professor Emerson Besch (University of Florida, Gainesville) described the shaky foundations on which these standards are built. The foundations consist largely of the results of few studies by a researcher named Runkle (later extrapolated by Munkle!) on removal of odors from rooms in which animals are housed. Most current practices are based on modifica-
tions on these early data as required by idiosyncratic needs, and have now become entrenched through habit and tradition.

The problem of inappropriate regulation (with special reference to transport) was addressed in detail by Mr. James Foster, founder of and guiding light behind the newly formed Research Animal Alliance. He argued that transport of small laboratory animals has been profoundly and adversely affected by government regulations which have indirectly led to a growing unwillingness on the part of airlines to ship animals. The fact that the International Air Transport Association and the United States Department of Agriculture have different standards further complicates matters. Foster stated that no one would argue with a policy which ensured the shipping of animals under the best possible set of standards, but that a lack of sound data has created the present controversy over temperature and ventilation.

Apart from stressing the need for better data, Mr. Foster also called upon laboratory animal scientists to work openly and aggressively with the bodies which regulate laboratory animal commerce and use as well as with those public interest groups which monitor the activities of the suppliers.

While better information is an absolute prerequisite to better regulation, the human element plays the most important role in determining the quality of laboratory animal health and care. A paper entitled "The Human Factor," by Dr. H. Dieter Brede of the Federal Republic of Germany, enlarged on this point, calling attention to the paralyzing breadth of factors facing laboratory animal scientists in modern facilities. The speed of technical innovation and the rapidly multiplying number of health and hygiene concerns could overwhelm the remarkable but still limited adaptability of human beings, resulting in irrational decisions with unfortunate consequences for both the animals and subsequent research projects.

**Animals in Education**

Educators, researchers and representatives of several animal welfare organizations participated in a conference September 27-28, 1979 in Washington, D.C. on the Use of Animals in High School Biology Classes and Science Fairs, sponsored by the Institute for the Study of Animal Problems and the Myrin Institute for Adult Education. The conference was organized in response to mounting concern over the present status of interventive animal experimentation in high schools and science fairs. Most states (excluding California, Connecticut, Illinois, Maine, Massachusetts and Pennsylvania) allow painful experimentation on vertebrates in secondary science classes. In addition, the rules of the International Science and Engineering Fair (ISEF), the competition which indirectly determines the conduct of science fairs at all levels in the U.S., have been cited for their laxity in the area of animal experimentation. The 1980 ISEF rules state that animal research using "anesthetics, drugs, thermal procedures, physical stress, organisms pathogenic to man or other vertebrates, ionizing radiation, carcinogens, or surgical procedures" may be undertaken with the direct supervision of a qualified individual (1980 ISEF Rules, p. 13, #4). According to conference participant Dr. F. Barbara Orlans (National Institutes of Health), these procedures demand a degree of sophistication not present at the high school level, and further, that the rules have proven inadequate in providing students with close professional assistance. She reported that in a 1972 study of eight science fairs, two-thirds of the projects using warm-blooded animals involved "infliction of pain or lingering death." This situa-
tion contrasts starkly with the current state of science fair projects in Canada. Dr. Harry C. Rowsell, Executive Director of the Canadian Council on Animal Care, outlined the regulations which have governed Canadian science fairs since 1975. In essence, the regulations prohibit experiments on vertebrate animals, but do allow “observations of normal living patterns of wild animals in the free living state or in zoological parks, gardens or aquaria” as well as “observations of normal living patterns of pets, fish or domestic animals.” (Youth Science Foundation Regulations for Animal Experimentation in Science Fairs, 1975).

Although the speakers and audience generally agreed that live animals can enhance the educational process and therefore should be used in the schools, the question of what these uses should entail generated considerable discussion.

Diverging philosophies on how to most effectively engender intellectual curiosity and a desire to pursue the sciences formed the kernel of the debate. Dr. Thurman Grafton, Executive Director of the National Society for Medical Research and Chairman of the ISEF Scientific Review Committee, argued that any extensive limitation on the use of live animals either in biology classes or at science fairs would stifle gifted students and possibly divert them from seeking careers in biology and medicine. Grafton also contended that the current permissive rules on live animal use in science fairs provide a freedom of choice which no more obligates a student to embark on a project involving significant manipulation of animals than a liberal abortion law obligates a woman to terminate her pregnancy.

Dr. George Russell (Adelphi University) identified the pedagogical problem of too much abstract knowledge and not enough direct acquaintance with phenomena (e.g., the student who can describe the genetics of Down’s Syndrome but cannot recognize an afflicted individual). However, he also voiced concern over the ethical dilemma created by attempting to justify interventive experiments which cause suffering to other forms of life on the basis of the imperative to learn. Dr. Russell questioned Dr. Grafton’s point on the relevance of animal experimentation to promoting student interest in the health sciences, and suggested that working in health care settings would do far more to foster a veneration for life and a commitment to its preservation. Finally, Dr. Russell asked educators to consider the possible negative psychological effects (desensitization, rationalization) on students who participate in painful animal experiments.

Several other speakers explored how developments in the history of science have influenced the ways in which animals, particularly vertebrates, are used in secondary biology education. Dr. Peter Kelly (Southampton University, UK) connected the traditional British ‘ornamental’ approach to the study of organisms to the zoological type system of Thomas Henry Huxley. The emphasis on laboratory display of living and dead representatives of various phyla has given way recently to more dynamic studies of behavior, ecology and genetics. Dr. Kelly stressed that although the study of live animals continues to be a significant part of British secondary science education, most activity is geared toward the descriptive rather than the experimental.

Dr. Frank Loew (Johns Hopkins University) presented a less sanguine view of attitudes in the U.S. The current predominance of biological research at the cellular and molecular levels indicates, said Dr. Loew, that scientists have lost “the naturalist approach to the study of plant and animal life...We always want to exert
control." The nonorganismic approach to research has obviously produced advances, but its effectiveness is predicated upon specialized training which cannot be provided in the average high school. As Dr. Russell said, "The advances in physiology and medicine through the use of animal experimentation, for example, have been very substantial indeed, but the question here concerns pedagogy, not research. No single experiment in high school advances human knowledge in the slightest."

An obvious question remains: If interventive procedures causing pain, suffering and death to animals are prohibited, what will take their place? Most of the conference participants who advocated noninterventive animal studies in the school had specific recommendations for humane alternatives. These alternatives, which ranged from the use of human cell tissue cultures to study human genetics to observation of animals in their natural states, are all motivated by the conviction that "humaneness supersedes curiosity," a phrase attributed by Dr. Orlans to Harvard professor of medicine Henry Beecher. However, curiosity need not be entirely squelched by limiting the amount of animal experimentation in high school and tightening the rules governing science fairs. Out of the sometimes strident arguments that enlivened the conference came a synthesis in the form of an agreement by Dr. Grafton and Mr. E.G. Sherburne Jr., Director of Science Services, the sponsors of the ISEF, to amend the 1981 International Science and Engineering Fair Rules to read that no studies involving significant manipulation of the animal or its environment shall be permitted outside a registered research facility or equivalent agricultural institute. This new rule would ensure that such projects would be a part of ongoing research within the confines of an institution, thus eliminating the possibility of improperly conducted home experiments.

The conference produced its share of mixed opinions on a controversial subject, but one basic belief united all the participants: the pursuit of knowledge about biological processes should be guided by educators skilled in the delicate task of nurturing curiosity and at the same time, inculcating a respect for life.


**ISAP Pain Symposium**

The Institute for the Study of Animal Problems (ISAP) held its first symposium on November 7, 1979 in conjunction with The Humane Society of the United States' annual conference in Orlando, Florida. The symposium, entitled "Pain, Stress and Suffering: Definition, Quantitation and Application to Animal Welfare Issues," grew out of discussions within ISAP over the past eighteen months on the complex and sometimes nebulous question of pain in animals. Pain is usually conceived of as a highly subjective experience. To the extent that humans can 'know' each other's minds (i.e. through language), they can directly communicate the presence of pain. However, human attempts to understand the subjective experiences of nonhumans depend primarily on observation of nonverbal behavior, intuition, and sophisticated physiological testing. The symposium brought together speakers from Great Britain and the United States to grapple with the problem of what constitutes suffering to animals that clearly feel, but do not share our vocabulary of pain.

In the morning session, Professor A. Iggo (Edinburgh University) focused on the central question of whether pain can be quantified. He argued that since no scientific grounds exist for anthropomorphizing
sensory states in other animals, assumptions must be made and their validity tested in scientific studies. Several such studies in electrophysiology recently indicated that all mammals have similar cutaneous receptors and thus similar underlying sensory mechanisms. However, it has also been shown that in man, the frontal lobes of brain play a role in the perception of pain (as distinct from the sensory registration of pain). Professor Iggo illustrated this distinction in a story about several human patients who suffered chronic, intractable pain. After undergoing frontal lobotomies for unrelated reasons, they reported that the pain was still present, but was no longer important. It is therefore plausible, in Professor Iggo's view, to base assumptions on the perception of pain on the relative development of the frontal lobes of different species. Although other animals may possess essentially the same subcortical machinery for expressing reflex reactions, their cerebral cortical responses to pain may be significantly different. The distinction between sensation and perception does not, however, resolve the question of whether responses differ in kind or only in degree.

The second presentation by Professor T.H. Friend (Texas A & M University) dealt with the problems of recognizing and quantifying stress. Professor Friend defined an animal as being stressed "if abnormal or extreme adjustments in its behavior or physiology occur in response to its environment." He mentioned the often overlooked fact that stress can be pleasant (as in the case of extreme elation) as well as unpleasant, and that the lack of stimulation resulting from isolation of individual animals can be as stressful as the reverse situation of overcrowding. After asserting that the complete absence of stress is neither possible nor ideal, Professor Friend described behavioral and physiological methods for quantifying stress in large food animals. Behavioral methods include noting the absence of normal or presence of specific abnormal behavior; allowing the animal to choose among several environments (preference tests); quantifying a particular behavior and then equating its frequency of occurrence with varying degrees of stress; and making subjective judgments based on direct observation of an animal's appearance and activity. All of these methods have basically the same drawback: how can one be sure that an observed behavior is an indicator of stress? Physiological test methods can relieve this uncertainty to a degree. For example, heightened adrenal cortex activity as measured by blood corticosteroid levels would indicate stress. However, physiological tests can also yield erroneous results. Blood corticosteroid levels may not always reflect increased adrenal activity under stress, due to adaptive mechanisms which speed up metabolic rates, thus keeping the levels within the normal range. Professor Friend recommended an integrated approach in which behavioral observations are supported with physiological data. He illustrated this approach with a discussion of his own recent studies in dairy cow husbandry (see ISAP Bulletin 1(7):7, 1979).

Dr. Michael W. Fox, Director of the Institute for the Study of Animal Problems, followed Professor Friend with a presentation on animal awareness of suffering. He stated that although suffering occurs in 'natural' forms, such as starvation in the wild and the predator-prey relationship, it is the scientist's task to evaluate the suffering created by human intervention, whether in the form of trapping, bullfights, rodeo, etc., or the more subtle and complicated practices of intensive farming and animal experimentation. Dr. Fox brought attention to the limits of the scientific method in assessing animal suffering and called for a more intuitive and em-
pathetic understanding of an animal’s physical and psychological requirements for well-being. Dr. Fox also suggested that the apparent inability of animals to foresee a future end to suffering or to rationalize its benefits may render them more sensitive than humans to the experience.

Dr. Bernard Rollin (Colorado State University) expanded on some of the ethical questions raised by Dr. Fox and offered a philosophical analysis of the various assumptions which underlie man’s treatment of other animals. Dr. Rollin argued, primarily through analogies, that the differences which exist between humans and other animals are not morally relevant and therefore cannot be used to justify the treatment of animals as property or beings without a nature (telos). Until a creature is developed which is devoid of any needs except those which directly serve a human purpose (e.g. a ‘chicken’ which plucks, dismembers and fries itself), it is morally necessary to put realistic constraints on the use of animals for human benefit. Dr. Rollin recommended two principles applying to the use of laboratory animals which he believes should be codified as law: the utilitarian principle and the rights principle. Enforcement of the utilitarian principle would eliminate those experiments in which the proposed benefits would fail to outweigh the suffering of the animal. If an experiment is deemed acceptable, the rights principle would ensure that the procedure be designed to maximize fulfillment of the animal’s needs and nature regardless of the cost. Although Dr. Rollin acknowledged that many researchers would view these constraints as an intolerable burden, he attributed this attitude to a pervasive but incorrect view of science. Recalling past major scientific advances, Dr. Rollin maintained that science consists not solely of observation, experimentation, or the gathering of facts, but also of thought, imagination and insight. The constraints suggested would thus promote better science through better experimental design and the use of animals as models only after careful theoretical consideration.

The afternoon presentations provided a look at the application of theories on pain, stress and suffering to particular animal welfare issues. Dr. Roger Ewbank (Director, Universities Federation for Animal Welfare, U.K.) discussed optimal environmental conditions for farm animals. He noted the value of preference tests in assessing the welfare implications of various husbandry systems, but added that for the present, direct behavioral observation is most reliable. Observation, however, must be accompanied by a thorough understanding of the behavioral signs of health as well as those of stress.

Dr. Thomas Wolfe (National Institutes of Health) devoted the majority of his presentation to a review of the NIH guidelines for laboratory animal care. Relatively little is known about what constitutes optimal conditions for laboratory animals. [See Charles River Symposium]. Dr. Wolfe cautioned against equating ‘natural’ with ‘optimal’, pointing out that ancestral conditions can be undesirable for highly inbred laboratory species. Instead, Dr. Wolfe advocated a sort of acculturation process in which the naive animal is exposed in early life to the sensations and stimuli it is likely to experience later. This early training enables the animal to develop adaptive responses to future stressful situations. Identification of ethological needs and incorporation of features which meet those needs into the laboratory environment also reduce fear and concomitant distress.

Since scientific enquiry into animal sentience is a relatively recent development, any exchange of views and information is, by nature, heuristic. Although the symposium
may not have produced tangible results, the fact that it took place attests to scientists’ growing interest and willingness to share knowledge in an effort to better understand this facet of animal welfare.

Selected papers presented at the symposium will appear in future issues of the Journal. The complete proceedings will be published according to interest and demand.

FORTHCOMING MEETINGS


American Society of Primatologists: Third Annual Meeting, June 3-5, 1980, Wake Forest University, Winston-Salem, North Carolina. Contact Dr. David M. Taub, Dept. of Comparative Medicine, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, NC 27103 for local registration, and Dr. Douglas M. Bowden, Regional Primate Research Center SJ-50, University of Washington, Seattle, WA 98195 for enquiries on program content.

ANNOUNCEMENTS

Ethics and Animals
The Society for the Study of Ethics and Animals has been established in Blacksburg, Virginia to provide a forum for the discussion of ethical questions on the treatment of animals.

The Society held its first meeting in New York City December 27-30, 1979, coinciding with the annual convention of the Eastern Division of the American Philosophical Association. Papers and a panel discussion focused on the ethical relevance of ape language research.

Publication of a quarterly bulletin is scheduled to begin in early 1980. The bulletin will cover news in the field, report on a broad spectrum of courses and programs involving ethics and animals, and present reviews of philosophical and scientific publications. For more information, contact Professor Harlan B. Miller, SSEA, Dept. of Philosophy and Religion, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061 USA.

International Contest
In view of the necessity to form a scientific basis for up-to-date animal protection, the FELIX WANKEL RESEARCH AWARD FOR ANIMAL PROTECTION has been established, DM 50,000 being available annually for the distribution of prizes.

The purpose of the award is to express appreciation of the work of persons who have made outstanding contributions to animal welfare on a scientific subject and from whose research immediate benefit to animals has resulted. The papers may be from any branch of science, as well as the arts. Contributions in search of alternative methods to the use of laboratory animals will be of particular interest.

Conditions of entry:
1) Persons from any country who are concerned in their research work with experimental and theoretical problems of animal welfare and related subjects are entitled to participate in this contest. A short summary of essential results in German should be en-
Entries should reflect knowledge gained in the scientist's own research work.

Entries should be submitted, in triplicate if possible, by the 31st of December to the office of the "Felix Wankel Research Award for Animal Protection."

The entries are examined and evaluated by the Board of Trustees of the animal welfare research award. The decision of the Board of Trustees is final.

Awards will be granted up to a maximum amount of DM 50,000.

The right of publication of the prize-winning entries which have hitherto not been published will be transferred to the donor of the award.

On submitting entries, the authors accept the aforementioned conditions of entry as binding.

Further information may be obtained from the office of:

FELIX WANKEL RESEARCH AWARD FOR ANIMAL PROTECTION
Attn. Dir. H.-J. Weichert
Orolindestrasse 6/83
D-8000 Munich 81
Fed. Rep. of Germany

A list of previous prize winners, the amounts of their awards and the topics of their papers follows. [Papers of special interest will be discussed in subsequent issues of the Journal.]

Previous recipients of the Felix Wankel Award:

1973
Dr. P. Bachmann (Munich) DM 6000
The use of cell cultures in pathogenic virus research

Dr. P. Weigert (Munich) DM 4000
The influence of exhaust gases on enzyme activity in rat and mouse serum

Dr. H. Schulze (Munich) DM 4000
Food production and animal welfare

1974
Dr. P. Loeffler, Dr. D. Marx (Hohenheim) DM 6000
Raising piglets in cages

Dr. C. M. Teutsch (Karlsruhe) DM 6000
Sociology and ethics of the human-animal relationship

Dr. G. Wennrich (Celle) DM 6000
Behavior of hens in henhouses

1975
Ms. S. Kobler (Unterpfaaffenhofen) DM 2000
The animal as object and living thing

Dr. D. Schulz (Berlin) DM 2000
Pain perception in fish; humane killing of eels

1976
Dr. A.B. Parkes (Cardiff) DM 5000
Lymphocyte metabolism as a model of human and mammalian cell metabolism

Dr. G. Riese, Ms. G. Klee (Munich) DM 5000
Calf behavior under different husbandry conditions

Dr. H. Studer (Bern) DM 5000
Sow behavior under different housing systems

Dr. H. Brummer (Geissen) DM 3000
Various papers in veterinary medicine

Dr. C. Ring (Munich), Dr. H.M. Blendl (Grub) DM 3000
Transport standards for pigs going to slaughter

Dr. G.V. Sherbet, Dr. M.S. Lakshmi (London) DM 3000
An in vitro assay for malignancy for use in cancer research and clinical management

1977
Dr. B. Ames (Berkeley) DM 15,000
A salmonella/mammalian-microsome mutagenicity test for detecting carcinogens and mutagens

Dr. G. van Putten (Zeist) DM 15,000
Seven papers on pig and calf behavior

Dr. H. Marquardt (Hamburg) DM 5000
In vitro chemical oncogenesis

Dr. U. Schnitzer (Karlsruhe), Dr. P. Kammer (Bern) DM 5000
Evaluation of stalls according to resting behavior of dairy cows

Dr. H.H. Sambraus (Munich) DM 6000
Compassionate attitudes toward cattle
Dr. K. Bonath (Essen) DM 2000
Narcosis in reptiles, amphibians and fish

Dr. E. Kazmaier (Munich) DM 2000
The present status of animal welfare in cattle husbandry

Dr. H. Petry (Munich) DM 2000
Magnetic marking of fish

Dr. A. Steiger (Hinterkappelen) DM 2000
Influence of husbandry systems on health and productivity of pigs

1978
Dr. H. Kraus (Mettman) DM 2000
Comparison of hens housed on soil floors and in battery cages

Dr. G. Steger (Nürnberg) DM 2000
Should companion animals be protected species?

Dr. H. Steinel (Munich) DM 3000
Social behavior of calves

Dr. D. Manz (Frankfurt) DM 3000
An oral rabies vaccine for the red fox

Dr. G. Muntau-Leitner (Munich) DM 3000
Involvement of the veterinarian in animal welfare

Dr. G. Martin (Stuttgart) DM 5000
The welfare of hens in battery cages; battery cages and the German Animal Welfare Act

BOOK REVIEWS

ANIMAL EXPERIMENTATION IN INSTITUTES OF SCIENTIFIC LEARNING DURING 1977 (Dierproeven bij de instellingen van wetenschappelijk onderwijs in 1977) [Government Publishing Office, Gravenhage, The Netherlands, 1978, 8 Guilders/$4.00, Dutch] is a report containing the results of a survey of the use of laboratory animals in thirteen institutions of higher learning. Approximately 425,000 animals were used during the course of 1977, of which 380,000 were rats and mice. However, these overall statistics conceal a great deal of interesting and detailed information on animal experimentation which can be found elsewhere in the report. For example, one table presents data on the use of animals in the medical facility at Leiden University over the last fifteen years: 82,000 animals were used in 1962; 79,000 in 1967; 77,000 in 1970; and 63,000 in 1977. The gradual fall in these figures should certainly encourage those promoting alternative techniques and campaigning for a reduction in the number of animals designated for experimentation.

Most of the data is in tabular form, but extensive footnotes furnish useful information on the types of research going on in the various disciplines (38 research sections listed for Utrecht University), the person(s) responsible for animal care, and registration requirements for animal experiments.

This report will prove most helpful to anyone who is interested in the details of basic biomedical research and who has a sufficient command of the Dutch language.

A.N. Rowan

INTENSIVE HUSBANDRY OF LIVESTOCK FROM ETHICAL, LEGAL AND ETHOLOGICAL PERSPECTIVES edited by D.W. Folsch (Birkhäuser Verlag; Basel [Boston], 1979, $18.00, German with English, French and Italian abstracts) is the eighth volume in the Birkhäuser Animal Management: Ecology, Ethology and Health series. It contains the opinions and recom-
mendations of the International Society for Livestock Husbandry, a scientific group which was formed to promote husbandry systems compatible with the ethological needs of food animals to the appropriate authorities, primarily in Europe. These recommendations should prove equally interesting to a wider audience, including animal scientists, stockmen and animal protection agencies.

The volume assembles an array of convincing arguments for a more enlightened approach to animal management, one in which the emphasis shifts from the economic imperative which created the ‘factory farm’ to an awareness of our moral and legal obligations to animals to employ rearing and housing methods which minimize suffering and maximize the possibility for fulfillment of their ethological requirements. The material is well selected and well organized, progressing in order from relatively abstract considerations of whether intensive farming is ethically justifiable (G.M. Teutsch concludes that in its present form, it is not) to a look at the legal implications of the Federal Republic of German’s Animal Protection Act for perpetual confinement systems (E. Von Loeper says that battery caging of laying hens contravenes certain sections of the Act) to ethological statements on the welfare requirements of intensively reared fowl and swine.

All of the authors agree that perpetual confinement constitutes improper treatment. The articles dealing with ethology offer alternative management solutions. Laying hens, according to G. Martin, should be kept in deep litter pens to avoid the frustration of movement, insufficient nourishment and suppression of innate behaviors which result from battery caging. Similarly, authors J. Müller, A. Nabholz, G. van Putten and H.H. Sambraus state that in order to be considered minimally acceptable, swine management systems must provide a nonperforated lying area to prevent foot and leg injuries, straw bedding or loose straw to allow pigs to explore and chew, at least one hour of exercise, adequate room and bedding material for farrowing sows, and sufficient light and fresh water.

The articles share a dispassionate, scientific tone, yet they also convey a certain conscious-raising urgency in their conclusions and recommendations. Although abstracts of the German text are provided, translation problems abound, at least in the English portions. (However, this is not true of the final article on swine management. Clearly, the complete volume had more than one translator.) Still, the general sense remains intact, and the abstracts suffice for a cursory reading. Typographical errors, fractured grammar and hit-or-miss vocabulary can be taken in stride with the realization that this important book will reach many more readers in its multilingual form.

N.A. Heneson

SOCIAL STRUCTURE IN FARM ANIMALS by C.J. Syme and L.A. Syme (Elsevier, Amsterdam, 1979, $39.00) is a detailed and up-to-date review of the social behavior of farm animals. It is a welcome addition to animal science and veterinary libraries and provides useful reference material for the applied ethologist and animal welfare scientist. The monograph consists of five chapters dealing with social dominance in farm animals: leadership, territoriality and individual distance, social density, crowding and group size, and a summary chapter which points the way toward an improved theoretical basis for studying the behavior of farm animals. Author and subject indices complete this fourth volume in Developments in Animal and Veterinary Sciences.

A major limitation in many of the ethological studies cited by Syme and Syme is that the experimental designs rarely approximate ‘field’ conditions. For example, a study of the effects of group size on aggression in adult fowl
kept in free-range groups of 6, 12 and 24 birds may be relevant only to other birds of the same age and strain kept under comparable conditions. However, knowledge derived from laboratory studies need not be irrelevant if it can be shown that the behavioral phenomena observed are not wholly context-determined.

More comparative ethological studies are needed in this connection to determine which behavioral phenomena are ‘normal’ or species-typical and which are affected by different husbandry practices. Without basic data of free-range behavior and comparative studies of animals kept under various husbandry systems to provide a yardstick for what is ‘normal’, husbandry-created influences may remain unrecognized and consequently, uncorrected. Complete ethograms of all farm species, including the behavioral effects of age, sex, strain, social grouping and husbandry practices (e.g., stocking numbers and density) would therefore be of great value. Applied ethological studies should also consider the potential management and economic importance of research reports, since theoretical studies often generate data of little relevance to the producer and to the animals’ welfare under ‘real life’ conditions.

Although the authors do not argue strongly for comparative studies of husbandry conditions on various farms, they do make the important point that economic factors should serve as aids to research evaluation rather than as the basis for rules which may overlook equally valid animal welfare considerations.

M.W. Fox

BOOK ANNOUNCEMENT

Bibliography on Diseases of African Wild Animals

Dr. Lars Karstad, one of the best known wildlife specialists in North America, has lived in Africa for several years, studying the interrelationships between diseases in domestic and wild animals. INFECTIONS, PARASITES AND DISEASES OF AFRICAN WILD ANIMALS (International Development Research Centre, Box 8500, Ottawa, Canada K1G 3H9, IDRC-135e, 1979) is a partially annotated, indexed bibliography of the large collection of literature Dr. Karstad has accumulated during the course of his work.

BOOKS RECEIVED


Vocal communication in the Asiatic Jackal (Canis aureus).

JACKIE THE JACKAL

Jackie the Jackal
Wanted to cackle
The way he'd often hear hyenas do
He'd raise up his hackles
At herons and grackles
He just wanted to cackle too.

But he could just howl
And growl at fowl
Or 'casionally bark at a duck
For God made the jackal
To tackle the grackle
And not to be pushing his luck!

James A. Cohen
Department of Zoology
University of Florida

CLASSIFIEDS

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7. Tables: These should be concise and typed double-spaced throughout. Complex tables are not acceptable.

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News and Comment Articles: These should not be longer than 2000 words (news items 1000 words at the most, and where necessary should contain brief references (e.g., J Appl Ethol 10:111, 1979) in the text. However, references should be kept to a minimum.

Review Articles: These should be between 5,000 and 10,000 words with a comprehensive list of references in order that the reader may use them as source material.

Original Reports: These should be long enough to provide an adequate introduction (stating the objective of the study and why it is considered necessary), description of methods (including an outline on the treatment of the research animals and the number of animals used), and a combined results and discussion section.

Note: The above requirements are given as a guide only and will not be rigidly applied. One double-spaced typed page contains approximately 250 words.

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