News & Review

Farm Animal Welfare Poll in Australia

Australian National Farmpoll VIII reveals (in *The National Farmer,* January 22, 1981) that an overwhelming majority of those polled (87%) "recognized that cases of cruelty and mistreatment of animals are still widespread in agriculture." Fifty-nine percent rated their farm organizations' responses to welfare issues as poor, and 85% believed that the welfare movement has the capacity to damage the farmer's standing in the eyes of fellow Australians. Fifty-nine percent felt that a responsible counter-lobby should be set up while 30% felt that they should talk and negotiate with welfare advocates. Fifty-three percent rated a ban on battery cage rearing of hens as an average-to-good policy; 35% rated less restrictive rearing of hogs as an average-to-good policy; 65% opposed a proposed policy of giving anesthetics for such operations as dehorning, mulesing, and castration. A third of the farmers surveyed felt that animal welfare interests were considerably discounted for economic reasons.

Effects of Domestication on Cognition

Anyone who has seen sheepdog trials or watched the complicated dressage performed by various types of show horses, and then compared his or her impressions with those formed from observation of the consistent, relatively invariable and stereotypical behavior of a wild animal might well conclude that the domesticated animal, because of its ability to be trained, has superior ability to learn and hence greater intelligence. However, this view fails to make a distinction between the mechanism for acquiring the proper response to a cue and the mechanism for learning to solve problems.

Harry Frank, in a paper entitled "Evolution of canine information processing" (*Z Tierpsychol 53*(4):389-399, 1980), examines this distinction in a comparative analysis of cognitive functioning in wolves and domesticated dogs.

Domestication proceeds by artificial selection, "artificial" in the sense that human beings as well as environmental conditions exert control over which behavioral and anatomical features survive through successive generations. One obviously desirable trait to foster in domesticated animals is tractability; according to Dr. Frank, tractability was probably inadvertently selected for in the midst of selection for other traits in dogs because animals whose behavior was difficult to control would have been eliminated from the breeding pool. Dr. Frank relates tractability to two properties of the canine "information processing system": responsiveness to a broad spectrum of stimuli, such as that used in human communication, and enough plasticity to allow behavior to be shaped and reinforced by the techniques of instrumental conditioning that are used in training.

In contrast to dogs, wolves tend to learn through observation, as in the case of a female wolf in Dr. Frank's group that learned to open a door after watching a wolf-malamute hybrid perform the task just once. Although the hybrid used his muzzle to unlatch the door, the wolf used her paws. Observational learning implies recognition of means/ends relationships; the observation of the substitution of a functionally equivalent behavior (using paws instead of muzzle) adds support to the notion that the animal "...understands the instrumental nature of the action he [in this case, she] observes."

From an evolutionary point of view, one can ask the question: Why should observational learning be favored under natural selection and superseded by the

ability to learn by instrumental conditioning under conditions of domestication? Dr. Frank proposes that in a wild and potentially hazardous environment, selection would favor the ability to learn quickly the consequences of one's actions. However, in an environment defined largely by man, the human being becomes a kind of buffer, shielding the animal from the consequences of its mistakes. Thus survival becomes contingent on tractability, *i.e.*, the ability to respond to a wide range of cues from humans although the response has no discernable functional connection with its result.

This answer is incomplete, as it does not account for the rigid, stereotyped behavior that is seen alongside playfulness, curiosity and problem-solving in the wolf. To tie this loose end, Dr. Frank puts forth the idea of a dual or "duplex" information processing system in the wolf: one component is complex, flexible and inventive; the other responds with consistency to a narrow band of stimuli. This latter type of system would also have a function in a wild environment since in some circumstances (communication, defense of cubs and food, etc.) a correct first response would obviously be preferred over learning from one's mistakes. In the wolf it seems that with the appropriate cue, the instinctual system usually overrides the cognitive one, which probably developed later in connection with the evolution of cooperative group hunting.

In the domestic dog, however, the two systems seem to have fused. For example, instinctual sucking and rooting disappear as such and become incorporated into more complex behavior patterns quite early in dogs, whereas it is possible to induce this basic nursing behavior in wolves well into adulthood. Similarly, barking takes a longer time to develop in the dog than in the wolf, and dog barks are more complex and differentiated than those of wolves. Selection for tractability could have achieved this fusion of cognitive and instinctual systems if it coexisted with the prolongation of other juvenile characteristics. Selection for neoteny in anatomy and physiology would then have carried with it selection for arrested development of the ability to inhibit unreinforced responses, which is associated with maturation and is a prerequisite to both creative and stereotypical behavior.

Shrinking Habitat for Britain's Wildlife

Efforts aimed at protecting individual wildlife species rather than their habitats are proving to have devastating effects on Britain's wildlife populations. Except for those areas designated as SSSIs (Sites of Special Scientific Interest), which occupy less than 6% of the land, the majority of wildlife habitats is being destroyed. Various studies report such immense losses that it is feared less than one half of the land covered by natural vegetation will remain by the end of the century. Such is the view of Dr. David Goode, Assistant Chief scientist for the Nature Conservancy Council (NCC), the British government's own advisory board.

Writing in *New Scientist* (89:219-223, 1981), Dr. Goode indentifies three primary factors contributing to the problem: 1) intensification of agriculture, 2) production of commercial forests, and 3) urban development. Grassland and heathland have suffered average losses of 35% and 61% respectively from fertilization, liming and cultivation. The development of commercial forests, which replace the native broadleafed oak and ash trees with conifers, accounts for a 20% average loss of the deciduous woodlands. The destruction from urban development involves mainly farmland.

The NCC estimates that 30-50% of all ancient, semi-natural woodland has been lost since 1947, an amount roughly equivalent to that lost over the previous four centuries. One ecologist suggests that all remaining ancient woodland in Britain that does not receive special protection will disappear by the year 2025.

The surging rate at which habitats are being destroyed means that concern for particular wildlife species is no longer the issue; the threat now is to a major proportion of all wildlife in Britain. Once the habitats are destroyed, the flora and fauna indigenous to them are lost as well.

A bill currently before Parliament seeks to change this scenario. Entitled the Wildlife and Countryside Bill, it includes provisions to strengthen the existing legislation protecting important wildlife habitats. The NCC has publicly announced, however, that the bill is too weak and has requested a further provision ensuring notification of the NCC prior to any changes which would be "detrimental to the scientific interest of any SSSI." The NCC considers the range of habitats represented by the SSSIs as the minimum necessary to support viable populations of most wildlife species found in Britain. Under the existing regulations, however, the SSSIs are not given full protection—they can be destroyed. The provision recommended by the NCC would strengthen that protection, and consultation in advance to proposed changes would enable the NCC to compensate farmers and foresters in return for protecting wildlife.

The bill, having survived eight hundred amendments and eight days of debate in its report stage in the House of Lords, is now proceeding to the House of Commons (*New Scientist* 89:726, 1981). During the report stage, an all-party amendment which would have given statutory protection to the SSSIs was defeated by the government, which instead accepted a proposal which would allow the government to advise landowners against damaging SSSIs. However, the choice to ignore this advice would carry no penalty. In addition, the owners of about 40 SSSIs would be required to notify the NCC if they intended to develop these areas, in which case development would be postponed for twelve months during which the landowner and the NCC would confer on how the land should be managed. If both parties fail to reach an agreement, the NCC has the option to exercise its right of compulsory purchase. If the NCC does not purchase the land, the landowner is free to proceed with development.

To Pea Or Nut To Pea

Two researchers at the University of Texas at Austin have devised a method for collecting urine samples from vervet monkeys that takes advantage of a behavioral tendency of the animals and avoids the problem of routine isolation of individuals from the social group for restraining and catheterization.

According to T.M. Kelley and C.A. Bramblett (*Am J Primatol* 1(1):95-97, 1981), "[C]aptive vervet monkeys readily urinate on an intruder if caging conditions allow them to position themselves overhead." Acting on this observation, Kelley and Bramblett proceeded to train 8 adult males, housed in an outdoor cage (26m x 14m x 4m) with 35 other monkeys of various ages and both sexes, to urinate into beakers while perching on a horizontal bar located 2 meters from the ground. The training regimen employed positive reinforcement with rewards of peanuts, the number of which varied according to how well the monkey performed the desired task (sitting on perch; urinating from perch; urinating from perch "in close proximity to the observer;" urinating from perch into a beaker). Monkeys were considered to be completely trained when they directed three consecutive 'clean hits' into the beakers. Commenting on the training procedures, the researchers noted: "Although only the 8 adult males were rewarded, several females and juveniles began to position themselves correctly and urinate, apparently from observational learning."

In fact, the monkeys were a bit too keen on the new routine. Several of them started to urinate simultaneously, too rapidly for collection of individual samples. This problem was solved by making each subject wait until the observer was directly in front of him and

then saying "Sit, (name of monkey)!", after which the monkey urinated. Another problem arose when high-ranking males lurked near urinating males of lower rank and snatched the peanut rewards from their rightful owners. The observers solved this problem by improving their timing in handing out the peanuts and also by waiting until the coast was clear of dominant animals.

Kelley and Bramblett estimate that training, if carried out on a daily basis, could be completed within 2 weeks to 2 months, depending on the relative reticence and precocity of the particular subjects.

The advantages of this method are fourfold: if behavioral endocrinology is being studied, this procedure produces less distortion than prolonged isolation and restraint; the same members of a social group can be sampled several times a day every day for an indefinite period without repeated venipuncture, restraint or catheterization; members of the group may show intensified behavioral differences through interactions stimulated by the sampling procedure, thus enabling researchers to obtain more accurate information on dominance, activity profiles and personalities; no additional staff or equipment are required.

Although the researchers expressed one reservation about their method, namely, its as yet unknown effect on the endocrinology of the group, they make a strong plea for their approach to be considered seriously as a "humane alternative to more traditional techniques."

Anesthetics for Draize: Follow-Up

A preliminary study by the Consumer Product Safety Commission (CPSC) of local anesthetics for the Draize test revealed that proparacaine HCL and butacaine sulfate were effective although both preparations increased irritancy and lengthened healing times of the affected rabbit eye (*Int J Stud Anim Prob* 2(3):120, 1981).

Further experiments, however, indicate that a third anesthetic, tetracaine HCL, does not increase eye irritation. In the initial tests, tetracaine was ruled out because of its delayed and inconsistent effects. However, when the dose was doubled in the follow-up experiment, tetracaine was judged to perform adequately as an anesthetic with the added benefit of not contributing to corneal irritation, except in the case where it was used with 5% acetic acid: Healing time was lengthened, but according to CPSC biologist Constance Hoheisel, the longer healing period "was not a great difference," and when used with the other ingredients (.5% sodium hydroxide, 70% ethanol and 10% liquid detergent), "the tetracaine came out in irritance response exactly the way the controls came out" (*The Rose Sheet,* FDC Reports 2(17), 1981).

The CPSC no longer conducts Draize tests on a routine basis. Proceeding from the belief that skin irritation is a predictor of eye irritation, it is asking manufacturers to label products as eye irritants if skin irritation tests on laboratory animals are positive. If the manufacturer refuses, the agency will begin Draize testing with a suitable ocular anesthetic in order to enforce the Federal Hazardous Substances Act labelling requirements.

Talking at Cross Purposes

In the last year or so, the Institute of Animal Physiology near Cambridge (UK) has been the target of much ire and abuse from animal liberation groups. The climax of the campaign was a demonstration outside the Institute coupled with a commando-type raid on the actual facilities. Those who broke in reported a number of horrific scenes and also claimed to have seen a two-headed goat and creatures that were half goat and half cow. These allegations, as well as others, are dismissed as nonsense in a recent article by Dr. B.A. Cross, Director of the Institute (*Vet Rec 108*:202-206, 1981). In so doing, he takes up the gauntlet thrown down by animal liberation

supporters. In fact, he specifically states that "...the most malign effect of the recent torrent of antivivisection propaganda, together with the verbal and physical abuse of research workers associated therewith, has been that politicians, administrators and even scientists have been reluctant to speak their minds in public for fear of attracting hostility." Cross, perhaps taking refuge in the knowledge that he has already attracted hostile attention, accuses antivivisectionists of spreading misinformation on animal research and adding to the forces of "restrictive utilitarianism," a phrase which has come to describe the efforts by both animal welfare groups and members of Parliament to restrict animal research only to that which leads directly to abolition of suffering or the prolonging of life in human beings and other animals.

Workshop on Humane Killing of Whales

In November 1980, a workshop sponsored by the International Whaling Commission (IWC) met in Cambridge, England to consider methods of improving techniques for killing whales. Comprised of experts from various fields including veterinary anesthetics, diving physiology, animal welfare and commercial whaling, the group reviewed the existing slaughter techniques with a view toward suggesting more humane methods. The workshop made several recommendations which were endorsed by the IWC. A summary of its report is presented below:

The group recognized that because of the stress imposed on the target animal by its selection, isolation and pursuit, a complete assessment of humaneness in the whaling industry must include a review of capture techniques as well as slaughter methods. However, due to inadequate information on the ethology of whales, the group confined its discussion to those components of the operation dealing directly with inducement of unconsciousness and death. The group formulated a working definition of "humane killing" as that which causes death without pain, stress or distress to the animal. This is the idealistic goal; realistically, any humane killing method would aim to render an animal insensitive to pain as quickly as technically possible. The group endorsed the view that developing the means to achieve rapid and painless killing of whales would serve to increase the efficiency of the whaling operations and thus improve the quality of the meat obtained. Therefore, a humane death for the whales would also serve the commercial interests of the whaling industry.

The group reviewed the most effective methods of rendering large mammals insensitive to pain and then considered the means of achieving this in whaling operations. The most rapid and practical route involves depression of the central nervous system or cerebral cortex. This can be achieved in several ways: shock from pressure waves or concussions; interference with blood supply to the brain; passage of electric current through the brain; chemical interference with neurological pathways (drugs); cervical dislocation or severing of the spinal cord. The animal can be killed immediately after becoming insensitive to pain (via the same mechanism), or some time later by another means.

Existing methods and new developments

Explosive harpoons — Used primarily in the slaughter of large whales. The whale is struck with the harpoon just behind the flipper at the horizontal midline. The flat-head grenade on the harpoon then explodes into 2 or 4 large pieces. The harpoon is meant to pierce the heart as the animal swims away. If the harpoon fails to penetrate a vital organ, the fragments of the grenade lacerate the blood vessels and cause hemorrhaging. In an Icelandic study, 4 out of 19 harpoons failed to explode, owing to either a defective harpoon or moisture spoiling the powder. To avoid this, several charges and detonators are reserved aboard the vessel. Japanese

whaling crews do not bring the charge and detonator on deck until immediately before firing.

Nonexplosive harpoons — Used in pelagic and small-type (minke) whaling. Cold, nonexplosive grenades are used in place of the explosive type as the latter would destroy too much meat. Again, the harpoon enters the animal behind the flipper, but in this case, death results not from hemorrhage, but from shock waves. In Japanese operations, an electric lance is used to kill the animal if death is not immediate (see below). In 1979, legislation was introduced in Norway requiring each small-type whaling vessel to use a large caliber rifle to kill the whale after it had been struck with the harpoon. Initial reports indicate that this method is successful. Efforts are being made to develop an explosive harpoon which could be used to kill minke whales rapidly. Apart from achieving rapid death, it is important to ensure the safety of the operators and cause minimal damage to the whale meat. Penthrite was selected over black powder as the preferred explosive, and harpoons containing penthrite are thought to have excellent potential for producing rapid and humane death. (The workshop also recommended that information on the failure of grenades to explode be obtained.)

Bomb lances — Used in bowhead whaling by Alaskan Eskimos. A bomb lance is fired at the whale to kill or disable it so that it can be killed by harpoon. If the whale is not harpooned, it may escape seriously injured.

Electrical methods — As previously mentioned, electric lances are used primarily in minke whaling to kill the whale if the first harpoon should fail. Electrodes are inserted on either side of the heart and shock is applied. Research into improving the design of the lances and the power supply continues. The Japanese are developing an electric harpoon that has its power source in the grenade. Electrocution is also under consideration as a slaughter method, but controlled studies must be undertaken to assess its effect on various parts of the body of aquatic, as opposed to terrestrial, mammals.

CO_2 injection — This method has three advantages: death by embolism is rapid, and as it is not necessary to hit a vital organ, the effective target area is large; the injection of gas ensures that the whale will float when dead; the meat is not tainted as quickly as when air is injected for buoyancy, as CO_2 lowers the body temperature and does not support oxidation. Two disadvantages of CO_2 injection are the possibility of freeze-burning of the meat due to a blocked cylinder and that processing of the meat must be immediate to prevent anaerobic bacterial decomposition.

Explosive bullets — First used experimentally in 1973-74 by Japanese whalers, explosive bullets were found to be ineffective, as it was difficult to shoot accurately under field conditions. Their use was discontinued soon after the development of the electric lance. There is some evidence to suggest that the use of high-velocity bullets is effective; however, to achieve the most rapid death, the bullet must be fired first or simultaneously with the harpoon. Research into the use of high-velocity bullets should be pursued.

Drugs and poisons — Whalers have experimented with drugs since the 1830s, but most of those tested have proved to be too dangerous to handle. Neuromuscular blocking agents such as strychnine, succinylcholine and curare are not recommended for use in the humane killing of whales. Anesthetizing drugs are acceptable if they meet the following criteria: no risk to personnel; effective when applied intramuscularly; leave no dangerous residues if whale products are to be consumed by humans or other animals; no threat to market from unfounded rumors of tainted meat. No presently available drug satisfies all of these requirements. While the use of drugs is not currently recommended, controlled experiments on the effects of certain drugs should be undertaken.

Injection of compressed gas— This method is fraught with practical problems such as how to deliver the gas, how to construct a valve capable of rapidly releasing such a large volume of gas, and how to market the product. The use of an inert gas such as argon is a possible solution to the marketing problem. Even if the practicalities could be worked out, evidence exists from experiments with swine that death from multiple gas emboli is painful.

The group also discussed problems connected with aboriginal whaling and stranded whales. The methods used in aboriginal whaling are likely to involve slow death by bleeding. Improvements in the techniques used should be examined as a matter of urgency; this might best be done through the IWC ad hoc Working Group on Management Principles for Subsistence Whaling, which convenes in July 1981. For stranded whales, killing was deemed the most humane alternative. For smaller cetaceans (up to 25 ft), shooting with a high caliber rifle is the preferred method. If the animal is shot through the blowhole in a line toward the anterior insertion of the flipper, the bullet will pass through the brain. (A large caliber handgun can be used for dolphins and porpoises.) Drugs are also acceptable. In smaller cetaceans, the blood vessels in the flukes are sufficiently visible to locate the central vessel and inject a suitable euthanizing agent. In larger animals that are more difficult to shoot, injection of a drug such as etorphine hydrochloride is potentially the most humane method. Care should be taken that the drug used does not have the potential to harm other animals that may scavenge the carcass of the whale.

RSPCA Pet-owner Responsibility Campaign

The Royal Society for the Prevention of Cruelty to Animals (RSPCA) has launched a nationwide publicity campaign on pet-owner responsibility, with an emphasis on neutering animals to help reduce a population that is "out of control," in the words of Janet Fookes, MP, chairwoman of the RSPCA.

The campaign literature features slogans such as "Is it your dog's sex life that stops you getting him neutered? Or is it yours?"; "As long as pets are bought like toys, they'll be treated like toys" and "Why should a society for the protection of animals have to kill 160,000 every year?" The campaign is designed to educate as well as to awaken, as evidenced by the information leaflets on the health and welfare of companion animals being made available.

An editorial in the *Veterinary Record* (*108*(16):343, 1981) praises the RSPCA's initiative, but adds a cautionary note about the "hard core" of irresponsible pet-owners. Measures taken by charities and by the veterinary profession to reach the pet-owning population will probably not suffice because of the unresponsiveness of this hard core; therefore, legislation may be necessary. In the meantime, the UK government could begin to create a climate in which responsibility for pets had more meaning by raising the fees for dog licenses to a "reasonable level." However, the government shows no such inclination at present.

The Strange Case of Jensen-Salsbery

According to U.S. federal regulation CFR §228(a)(4), annual reports must be filed by research facilities to the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS), indicating the number of animals used in actual research and testing. The reporting form is organized by species of animal covered by the Animal Welfare Act and types of experiment, which fall into three categories: experiments or tests involving no pain or distress (Category B); those involving pain or distress with the administration of appropriate anesthetics, analgesics or tranquilizers (Category C); those involving

pain or distress without the administration of any pain-relieving drugs (Category D). Routine procedures involving momentary pain or no pain, such as injections, tatooing and blood sampling, do not need to be reported.

Jensen-Salsbery Laboratories (Division of Burroughs Wellcome, 2000 South 11th St., Kansas City, Kansas 61103) filed 1979 annual reports from its three animal research facilities: the Biological Control Department, the Biological Research Department and the Biological Production Department. Of the three reports, all signed by Mr. J.A. McKeown, Production Manager, two had been altered so that the numbers entered in Category D (pain—no drugs) appeared in Category C (pain and drugs). The numbers in Column D were left with "X" marks through them. In addition, the number of animals reported was unusually large: 16,412 for the Biological Research Department and 2,120 for the Biological Production Department.

When informed of the discrepancy, Mr. McKeown stated that he had not changed the reports and had not been told by the USDA of any alterations. The USDA, responding to further enquiries, provided the following information:

In late 1979 or early 1980, Dr. Robert Whiting, then USDA-APHIS Chief Staff Veterinarian, contacted his area office in Kansas to enquire about the Jensen-Salsbery reports. After consulting with that office, Dr. Whiting relisted the numbers from Column D in Column C. He justified the action by referring to information he obtained from attachments to the reports, which are required to describe experiments or tests involving pain without administration of pain-relieving drugs. In this case, the descriptions were of "challenge testing," *i.e.*, injection of a vaccine or bacterin into a group of animals followed by injection of a selected disease agent to determine if the animals have been immunized. (A control group receives the virus or bacteria, but not the vaccine or bacterin.) Dr. Whiting reasoned that because the tests involved injections, which are considered under the regulations to be routine procedures, there was no need to report them. He added that he felt the research facilities had misinterpreted or were unaware of this exemption. Dr. Whiting maintained that these particular inoculations cause, at the most, only minor and temporary pain although he did concede that the infections induced in the control group, as well as in those animals that might receive an ineffective vaccine or bacterin, could cause considerable pain.

The disease agents used in the Jensen-Salsbery challenge tests were Leptospira, rabies virus and anaerobic bacteria. According to Mr. McKeown, who stressed that he was not a doctor of veterinary medicine, infection with Leptospira impairs kidney function: "...the animals die of renal shutdown." In the rabies challenge test, some of the animals die of untreated rabies, a disease whose progress is known to be painful in humans. Infection with anaerobic bacteria, as listed in the report's explanation, results in gas-gangrene and tetanus. The attachments to the reports note specifically that in each instance, *no* pain-relieving drugs were administered. Mr. McKeown assumed that infections which cause pain and distress in untreated humans cause similar pain and distress in untreated laboratory animals. Therefore, to comply with regulations, Jensen-Salsbery listed the animals in Column D.

The change made by Dr. Whiting resulted in the incorrect classification of 18,532 of the total of 22,551 animals reported in Table 5 for the state of Kansas, "Animals to which pain-relieving drugs were administered to avoid pain or distress" in the official report of USDA-APHIS on animal welfare enforcement for fiscal 1979 to the President of the Senate and the Speaker of the House of Representatives.

It would seem that if an alteration were to be made, the choice, based on both Mr. McKeown's evaluation and Dr. Whiting's stated reasons, would have been between omission and listing in Category B (no pain). It is puzzling why listing in Category C (pain and drugs) would have been an option at all, as

clearly no pain-relieving drugs were administered at any time. Further confusion arises from the fact that the figures from Jensen-Salsbery's third report (Biological Control Department) were not reclassified although the procedures described were either similar or identical to those outlined by the other departments.

In addition to the questions raised about the proper procedures for a government agency's altering a state annual report (Should the research facility be informed of changes made by USDA?), two other serious questions emerge: Are the regulations stated so ambiguously that such conflicting interpretations are possible? Is the exemption clause, which excludes the reporting of routine procedures, intended to include those procedures involving a routine activity but also going beyond, say, a simple injection? For while challenge testing does employ injection, and while the injection itself involves only minor, transitory pain to the animal, the infection produced may result in extreme distress. — *Mark Solomon*

EEC Says No Ban on Battery Cages

Early last year, we reported on the intentions of the European Economic Community (EEC) to investigate existing methods of egg production with a view toward banning the battery cage (*Int J Stud Anim Prob* 1(2):79, 1980). The EEC investigation had been urged on by the Federal Republic of Germany's Minister of Agriculture following a 1979 decision by a superior court in that country which made the battery farming of hens illegal on the grounds that it constituted cruelty. Pressure from both the animal welfare lobby and the poultry farmers in Germany prompted the EEC's attempt to standardize production methods among its member states.

The EEC Council adopted a resolution on 22 July 1980 recognizing the risk of excessive suffering by hens kept in battery cages and emphasizing the need for common minimum standards for the welfare of battery hens throughout the EEC. According to a recent report in *Ag* (Feb/March, 2-3, 1981), the Council, having completed its investigation, has recommended against a ban on battery farming of hens. However, the Council also agreed to continue its studies on the welfare of battery-caged poultry and on possible alternative husbandry systems. Adoption of rules governing welfare standards is projected for November 1981.

Seabird Mortality: Biology and Politics

In the 1970s, the netting of thousands of porpoises by the American tuna fishery attracted publicity to the problem of marine mammal mortality in commercial fishing operations. More recently, concern over the incidental take of sea turtles in shrimp trawls in the southeastern U.S. has resulted in negotiations between the industry and conservationists to modify the gear, timing and location of shrimping operations. Yet except for a core of specialists, the conservation and animal welfare communities have for several decades been neglecting another problem that in sheer numbers may be far more serious — the incidental mortality of seabirds due to commercial fishing.

Seabird mortality in fishing nets became significant with the advent of offshore salmon gillnet fishing, by the Danish in the North Atlantic and the Japanese in the North Pacific (King *et al.*, 1979). The Danish offshore operation ended in 1975, after only one decade. The Japanese gillnet fishery, begun in 1952, now comprises both a land-based fleet of independent vessels, and a high-seas mothership fleet (four processing ships and 172 catcherboats) that operates in the U.S. fishery conservation zone (FCZ). For Japan to continue its fishing operations in U.S. waters, it must obtain a permit allowing for the incidental killing of marine mammals, particularly porpoises. Although the focus of the deliberation has been on marine

mammals, the long overshadowed problem of seabird mortality has also become a point of contention.

It was not until 1974 that biologists were first able to obtain some estimates of the impact of the Japanese salmon fishery operation on pelagic bird populations. These early figures were based on research, rather than commercial, gear, and on broad geographic averages. A more recent study (Ainley *et al.*, in press) indicates that the size of the kill is considerably higher than previously reported, concluding that about 10 million birds have been killed in Japanese gillnets since 1952, with an average of 400,000 to 1.4 million annually.

Although gillnetting is a passive method (unlike seining or trawling), the size and configuration of the nets allow both marine mammals and seabirds to become entangled and drown. A single commercial net is 15 kilometers long; nets are set vertically from the surface to a depth of 6-8 meters, about 5 miles apart. Although there is no evidence that the marine mammals are attracted to the nets, the fish caught in the net apparently do attract a number of bird species. The foraging behavior of a particular species therefore influences the likelihood of its becoming entangled in the nets. Ainley *et al.* reported that 16 species of birds became entangled in the nets, either while diving after fish or while scavenging from the nets.

Experimentation with different sizes of mesh further revealed that the category including commercial mesh size had a statistically higher catch rate than all other categories. Two other factors influenced the catch rate: 1) productivity of the water, which determined the density of seabirds, and 2) distance from the Aleutians, which determined the number of birds from breeding colonies on the islands. Ainley *et al.* observed that the highest number of birds became entangled in nets within 50-75 nautical miles from shore.

The numbers of birds killed annually are staggering, yet the effect on seabird populations is debatable. One significant point is that the species caught have extremely low reproductive rates, each female laying a single egg. Although some species, notably the shearwaters, which migrate from the southern hemisphere, are caught in large numbers (27% of all birds caught in King *et al.s'* 1979 study), the catch represents a small percentage of their total population. Other species, especially alcids (puffin-like birds), appear to be caught more selectively, and the incidental take may be a substantial proportion of their population. King (1981) estimates that for Tufted Puffins, Horned Puffins, and Thick-Billed Murres, the incidental mortality alone accounts for 11.6, 44.0 and 21.4% respectively of the young produced in the Aleutian colonies. The salmon fishery is currently operating at an all-time low for economic reasons, but the actual impact on populations from the 25 years during which the effort was doubled and the geographic range expanded remains unclear. It is worth noting, however, that the Atlantic fishery, with a total salmon catch of about 1% of that of the Japanese fishery (King *et al.*, 1979), was responsible for significant population declines during its 10-year existence.

Biologists are concerned that the lack of research on and monitoring of seabirds will enable incidental take to go unchecked, possible with serious consequences for a number of breeding populations. They have therefore requested that conditions be attached to any permit granted to the Japanese, requiring observer coverage, population studies, and research on technical modifications to reduce incidental mortality of seabirds as well as marine mammals.

However, the issue is clouded by politics: Does the incidental take of seabirds constitute a violation of the international treaties protecting migratory birds? Which U.S. agency (the Commerce Department, which has jurisdiction over marine mammals and fishing operations, or the Interior Department, which has jurisdiction over seabirds) has regulatory authority in this case? Will too many conditions create political tension between the U.S. and Japan, possibly resulting in Japanese withdrawal

outside the FCZ, thus precluding any monitoring of incidental take of marine mammals or birds?

The probability is slim that any meaningful steps toward a resolution will be taken. Although the Solicitor's Office at Interior issued an opinion that the incidental take of seabirds in U.S. waters does indeed constitute a violation of the migratory bird treaties, it also concluded that under the terms of the treaties, U.S. territorial waters extended only three miles seaward. Interior's authority to enforce the treaties is therefore irrelevant, as most of the taking of seabirds occurs farther out at sea. The Commerce Department has refrained from denying outright its authority to impose conditions regarding seabirds on its permit to the Japanese; to have done so may have risked a lawsuit by conservationists challenging Commerce's claim of no jurisdiction, a lawsuit that might well have been successful. With negotiations rushing to a close before the onset of the 1981 fishing season, it appears that Commerce has taken an easy out. By attaching a series of weak recommendations to the Japanese permit, it will try to evade both a legal skirmish with conservationists and political pressure stemming from the imposition of overly restrictive conditions.

Few biologists believe that the fishery poses a real threat to the survival of marine mammal and bird species (although certain *populations* may be in jeopardy), at least during the next three years for which the Japanese have been authorized to operate in U.S. waters. But the controversy underscores some important aspects of wildlife conservation in this country: In cases where explicit statutory responsibility does not exist, certain "problem" species tend to become political footballs. Until precise data are available clearly indicating that a species is being threatened, the existing evidence is likely to be ignored, especially when economic and political pressure can be applied. The attitude of the Japanese industry and the American government toward any serious biological ramifications is that that bridge will be crossed when they come to it. By that time, irreversible damage may have been done to seabird populations. —*Natasha Atkins*

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Animal Regulation Studies — Abstracts

Buffalo Production and Regulation in Thailand — Agriculture in Thailand is largely dependent on animal power for farm operations. Mechanized farming is very limited in extent and distribution. The small size of the farm holdings and their large number are characteristics shared by many countries in Southeast Asia. The Swamp buffalo is the main source of animal power on the small farms and has traditionally been found to be ideally suited for the agroclimatic conditions and feed resources of Thailand. It is hard to replace the buffalo on the small farms by other economic sources of power.

Buffalo production in the country has, however, suffered long neglect. The projection of population figures for the year 2000 shows that besides the animals that would be needed for farm operations, 1.2 million head of buffaloes and cattle will be required annually to meet the needs of domestic meat consumption. In addition, more animals would be wanted to feed the expanding livestock export trade.

There is, therefore, great need and scope for developing buffalo production in Thailand. The present constraints to such development are discussed. The necessity for a buffalo breeding programme which takes advantage of modern techniques of artificial insemination (AI) and the need to apply effective methods for the detection of heat and the early diagnosis of pregnancy in Swamp buffaloes are explained. The progress made in Thailand in work on the reproductive physiology in the Swamp buffalo is presented in brief outline. Nuclear techniques have been used successfully in studies on reproduction in buffaloes, both in the female and male. The results of these studies are mentioned.

Plasma progesterone level has been found to be a reliable guide to the detection of heat and pregnancy as early as the third week.

Strategies for development of the buffalo at the small farm level are discussed. The scope for increasing buffalo production for beef on small farms is explained. The feasibility of cooperative buffalo ranching for beef production by the small farmers is discussed.

Buffalo production for beef should be exploited in Thailand. However, this will require suitable improvements to the existing regulations governing slaughter and production of meat, and the pricing and marketing systems together with the introduction of a grading system for beef which meets international standards.

Regulation of buffalo production in Thailand for increased milk production has a place in the context of a developing rural economy and needs consideration as a long range objective. — *M. Kamonpatana* (*Anim Regul Stud 3*:181-190, 1981).

Bovine Tuberculosis in Cattle in Great Britain I: Eradication of the Disease from Cattle and the Role of the Badger as a Source of Mycobacterium Bovis for Cattle — The eradication of bovine tuberculosis from cattle in Great Britain is described and the role of the badger (*Meles meles*) as a source of *M. bovis* infection for cattle is discussed. The control measures adopted when a link between badgers and M. bovis infection in cattle is established are outlined and the effectiveness of such measures is assessed. — *H.J.T. Evans* and *H.V. Thompson* (*Anim Regul Stud 3*:191-216, 1981).
Ed. Note: The role of the badger in the spread of bovine tuberculosis in Great Britain is currently the subject of considerable controversy. For other points of view, see, e.g. *Nature* (*290*(5803):183-184, 1981) and *The Beast* (No. 8:1-3 and No. 9: 8-9, 1981).

Muslim Attitudes to the Slaughter of Food Animals — Consumption of food of animal origin is freely permitted in Islam, and a large number of terrestrial and aquatic food animals is permitted, but swine, carrion and blood are prohibited. Slaughter, which is achieved by incision of the soft tissues of the neck, including the large blood vessels, can be performed by persons of either sex who are in possession of their mental faculties. Permitted animals slaughtered by Christians, Jews and Sabians are also lawful as food.

Particular emphasis is laid on avoidance of unnecessary suffering of animals before and during slaughter, especially on the sharpness of the knife used for this purpose.

The writer believes that modification of the method of slaughter is possible if it makes it really more humane and does not infringe the basic concepts. — *M. Abdussalam* (*Anim Regul Stud 3*:217-222, 1981).

Alleviating Road Transit Stress on Horses — The advantages of transporting horses facing away from the direction of travel were demonstrated in two independent studies of over 500 horses. As a result of changes in the positioning of the horses, loading methods, tethering, stall size, light, ventilation, and axle placement of the conveyance, transit stress was minimized. — *S.E. Cregier* (*Anim Regul Stud 3*: 223-227, 1981).

Polypeepers and Stress in Laying Hens in Cages and Pens — The effects of polypeepers (spectacles) on plasma corticosteroid concentrations were determined

in White Leghorn hens in cages and on litter and crossbred hens in cages. Polypeepers had no significant effect on mean corticosteroid concentration in hens in cages and unstressed hens on litter. Hens on litter which had been fitted with polypeepers were stressed by chasing and showed a positive adrenal response; this may have been due to the visual limitations imposed by polypeepers. — *J.L. Barnett* and B.E. Bartlett (*Anim Regul Stud 3*:229-235, 1981).

Federal Law and Animal Welfare — The U.S. Government promotes humane treatment of animals under the Animal Welfare Act and the Horse Protection Act. Both Acts are enforced by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA). Under the Animal Welfare Act, APHIS licenses or registers dealers, exhibitors, operators of auction sales, research facilities, and others. The Horse Protection Act prohibits the cruel practice of "soring" show horses to produce a high-stepping gait. This legislation provides for Federal inspection to assure compliance and authorizes penalties for violations. — *F.J. Mulhern* (*Anim Regul Stud 3*:237-245, 1981).