

## TAKING FORWARD THE COMMITTEE'S WORK ON FISH

The Committee's work plan for 2005 includes a commitment to commission a scoping study on the welfare of fish used in experimentation. Such a study would enable the Committee to gain an overview of potential fish welfare problems, and enable it to decide whether to carry out further work.

A scoping document prepared at the Chairman's request by Dr Hubrecht is attached, on which Members' comments are invited. Once agreed, the document could form the basis for inviting consultancy bids to carry out the work

APC Secretariat

June 2005

## **The Use of Fish in Scientific Procedures, What Are The Issues?**

It has been suggested that the Animals Procedures Committee (APC) may consider commissioning a report on the state of play with respect to the welfare of fish used in scientific procedures, and the ethics involved in their use. The purpose of this short document is to identify some of the issues that might be dealt with in detail in such a report.

### **Background**

Fish are used in fundamental research, as bio-indicators of man-made and natural pollutants, and in research aimed at improving the artificial cultivation and farming of fish.

Why should we be concerned about fish welfare? Under ASPA 1986, fish, along with other vertebrates, are protected species, however, there has been some debate regarding their ability to feel pain. Rose (2002) has argued that fish lack the neurological basis, specifically a prefrontal neo-cortex, to experience feelings of pain and perhaps other feelings. Nonetheless, Rose argues that fish welfare should be attended to due to potential impacts on health and well-being. Chandroo (2004a, 2004b) takes a different view and suggests there is evidence that the fish pallium, despite its unlaminated structure, is highly differentiated in terms of its processing ability and that there may be homologous areas of the fish brain that have similar functions to those of higher brain areas in tetrapods. There are striking similarities between fish and land vertebrates in some cognitive processes and their neural basis (Broglia et al. 2003, Brown et al 2003 and articles within). Indeed, most of the behavioural phenomena of interest for primatologists are found in fish, including social learning and tradition, individual recognition, and cooperation (Bshary et al. 2002). Similarly, in a briefing paper produced for the Fisheries Society of the British Isles (FSBI 2002) an expert group argues that fish show complex social behaviour akin to that of other vertebrates, have the capacity to perceive painful stimuli and that these are strongly aversive. Recent research by Sneddon (2003) suggests that fish may be capable of feeling pain in their lips. Nonetheless, as Johnston (2003) notes, Sneddon's paper does not address all the issues raised by Rose, and "the fundamental difficulty is in determining conclusively whether fish do or do not feel pain and lies in our inability to know what a fish is experiencing". This problem is not of course specific to fish but holds true for all non-human animal species (Kirkwood & Hubrecht 2001).

Publications on fish welfare, include reviews of the literature aimed at improving the housing and husbandry of fish. Examples of these include the recent Council of Europe revision of ETS 123, a review currently being prepared by the Canadian Council for Animal Care (Griffin et al. 2004) and websites such as those of AWIC.. The welfare of fish may be compromised by man's activities in areas other than the use of fish in scientific procedures, eg sport fishing , commercial fishing, fish farming and aquaculture , and there are a number of publications relating to fish welfare and humane killing in these areas. Much attention has been paid to determining suitable water quality to keep fish healthy and achieve satisfactory reproduction, with rather less being paid to designing fish accommodation to match species-specific needs or in determining the motivation of fish for specific resources in their environment.

The following is an attempt to list some questions that might be addressed in

the APC report.

### 1) Housing and husbandry

Recent reviews of housing and husbandry for fish have placed an emphasis on water quality, stocking densities and health, eg, Draft Revision of Appendix A to Council of Europe ETS 123. However, as Conte (2004) notes, fish in their natural habitats exhibit preferences for specific environments, and different species of fish have evolved in different habitats.

- What evidence is there that full use it is being made of existing knowledge on the natural history of different species to provide for the needs of different species in captivity?
- What recommendations are there for environmental enrichment, are they adequate, and what research is needed in this area?

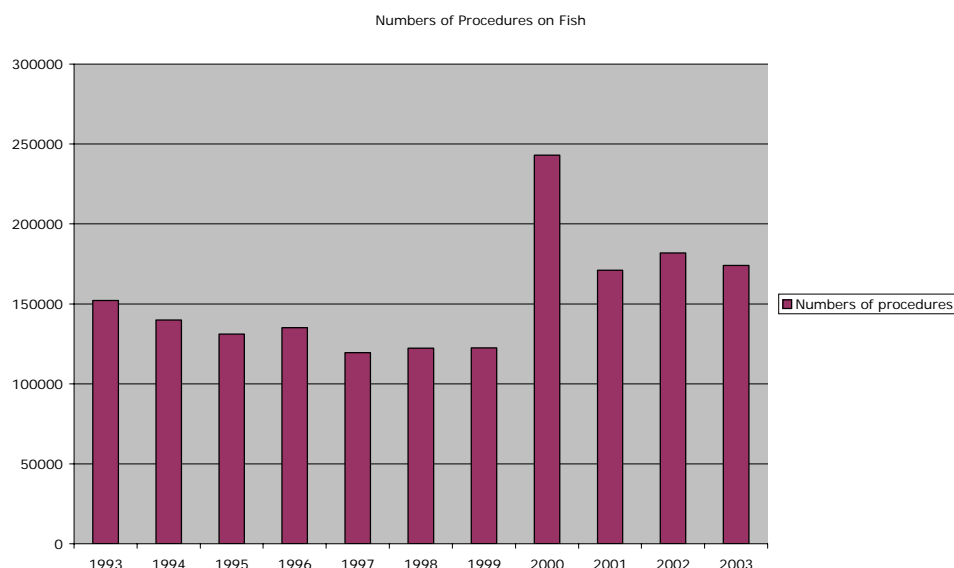
### 2) Capture and restraint

The capture of fish from the wild (for pure research or commercial use) is conducted without anaesthesia. Common capture methods include electric fishing, angling and trapping.

To what extent do capture methods vary in their welfare implications.

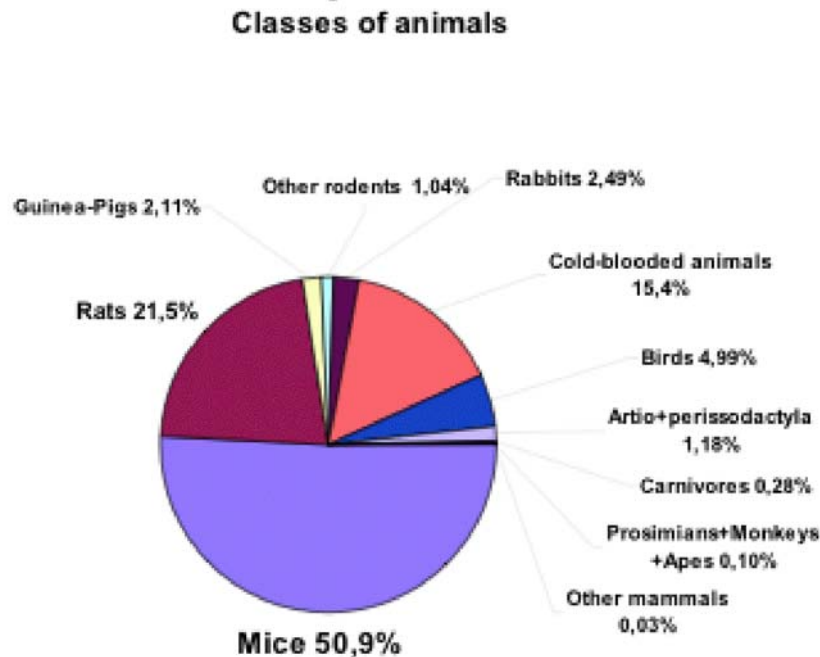
### 3) Numbers Used

In 2003, 173,988 procedures were carried out using fish. This represents 6.2% of the total procedures carried out on protected species. 52,766 procedures were carried out for toxicological purposes. There is no particularly obvious trend over the last 10 years in fish use, (although there was an obvious jump in numbers in 2000 see graph)



The total number of animals used for experiments in the EU in 2002 was 10.7 million (with one Member State reporting from 2001) (see Pie chart below for usage of different classes of animals). This represented an increase beyond the 9.8 million counted in 1999, but was still a decrease compared to the 11.6 million of 1996. The increase was mainly due to the additional use of about 970,000 fish (while other animal species decreased), raising the total of fish to

almost 1.6 million.



- the report might consider, on the basis of evidence provided by users whether the usage of fish is likely to increase, decrease, or hold constant in the near future.

#### 4) Species Used

- Which are the most common fish species used?
- What is the basis for species selection in various procedures? Is it more humane to use some species rather than others?

#### 5) Type of Procedure

- What sorts of procedures are fish used in,
- What sorts of suffering might be experienced in these procedures, and how are end -points set and assessed.

#### 6) Capacity for Suffering.

- What evidence is there for that the opportunity to behave in certain species specific manners (eg anti-predator behaviour, schooling behaviour might be necessary for good welfare?
- The Secretary of State may not grant a project licence [Section 5(5)] unless he is satisfied that the regulated procedures to be used are those that, while consistent with meeting the specific objectives, minimise the suffering caused by using: animals that have the lowest degree of (that is to say, have the least capacity to experience pain, suffering or distress). Generally species selection will be made on the

basis of suitability for purpose, however, is there any evidence that fish represent a lower neurophysiological complexity than alternative species, that is, is their capacity to suffer in some way less than that of alternative species?

- What evidence is there for differences in neurophysiological sensitivity at different stages in the life cycle of fish?
- What research is lacking in these areas?

## **7) Welfare Measures**

- Is there a need for easily applied indicators of fish welfare that could be applied at the individual or group level?

## **8) Anaesthesia, analgesia and euthanasia**

Some fish biologists believe that anaesthesia for small fish being exposed to certain procedures, confers a higher risk (of death) than the procedure itself. Indeed, for procedures such as marking and tagging, the need for anaesthesia is waived by the Home Office if the fish are small enough to be restrained by hand.

- What evidence is there for the effectiveness of current anaesthetics and analgesics for fish, and what evidence is there that different anaesthesia methods pose welfare problems in their own right?
- Is there a good basis for current euthanasia recommendations? Is the science as advanced as, for example, for rodents? If not what is needed?
- What are the risks of using anaesthetics?
- What further evidence is required with respect to euthanasia.

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