

The response reproduced below was submitted to the consultation held by the Nuffield Council on Bioethics on the ethics of research involving animals during October-December 2003. The views expressed are solely those of the respondent(s) and not those of the Council.

Biotechnology and Biological Sciences Research Council (BBSRC), UK

## **Introduction**

The Biotechnology and Biological Sciences Research Council (BBSRC) is the principal public funding agency in the UK for basic and strategic research in the non-medical life sciences. BBSRC's remit includes research that underpins advances in agriculture, food, healthcare, pharmaceuticals and bioprocessing.

BBSRC supports research and research training in universities throughout the UK. BBSRC also sponsors eight research institutes, three of which, Babraham Institute, Roslin Institute and the Institute for Animal Health, are internationally recognised centres of animal science research. BBSRC supports basic and strategic work on animal function from the level of genes and other molecules to tissues, physiological systems and whole animal behaviour. This includes basic and comparative studies in both vertebrates and invertebrates, including humans, but excludes clinical research and studies of specific human diseases.

## **Q1 What is your view about the use of animals in research?**

In BBSRC's view, biological and bio-medical research will continue to require animal experimentation for the foreseeable future and it is difficult to see how scientific advances could be made in future without the involvement of some animal experimentation. Animals offer by far the best way of answering questions about the functioning of complex systems such as those that regulate brain behaviour. Animal experimentation is also essential for research that is directed specifically at understanding more about the health, behaviour, welfare and natural history of animals, not least in order to improve the health and welfare of animals, for example in veterinary medicine and in the husbandry and management of livestock, laboratory and companion animals. Some examples are included in "Science and Animal Welfare" published by BBSRC in 2002 (accessible via the BBSRC web site. [www.bbsrc.ac.uk](http://www.bbsrc.ac.uk)).

BBSRC considers that the UK achieves a commendable balance between rigorous regulation in the use of animals, including most importantly that use is allowed ONLY when there is no suitable alternative, and providing a climate for research that enables the conduct of world-class bioscience in the UK. In addition to the ethical imperative to avoid the use of animals unless there is no alternative, and the legal constraint, researchers have other strong drivers to use non-animal alternatives because in most cases these would be cheaper, and they would avoid the regulatory procedures.

There are many examples where animal research has been of significant benefit to humans, the use of insulin to treat people suffering from diabetes being one of the most celebrated. We believe this to be an interesting example because it is one in which some animals also benefit from the use of insulin. A more recent example of knowledge being transferred from animal studies has been the indication that variant CJD is caused by the BSE agent (Nature 1997, 389, 498-501) from studies in mice.

Different types of research require different animal species. For example, research into treatments for bacterial and viral infections of livestock ultimately requires research using the target species, in the same way that medical research requires clinical studies in humans.

The similarity between counterpart genes in widely divergent species, and the similarity in overall organisation of genes on chromosomes means that through comparative genomics it is increasingly possible to use information about gene function in one species as a predictive guide to the role of similar genes in other species. This is the basis of the value of animal genetic models and transgene experiments in, for example, mice to the understanding of gene function in humans. However, it also means that some genomics work might be conducted in “simpler” animal species than hitherto. For example, research has revealed genes in the fruit fly that govern functioning of its renal tubule, which have direct functional counterparts in rats and humans.

It is important that researchers should be aware of advances in genomics and other new developments in reviewing the appropriateness of a particular species for their research. In the same way, it is important that researchers should be aware of insights coming from research into the way animals perceive the world around them, (some of which is funded by BBSRC, and examples of which appear in “Science and Animal Welfare”) as this can help to identify opportunities to improve the welfare of laboratory and other animals, and might have implications for the choice and management of species to obtain the most valuable results.

## **2. What are your views about the use of GM animals in research?**

GM animals are very valuable in basic research into the role of genes in normal and pathological conditions ( e.g. GM mice in understanding the nature of species barriers and pathogenesis of transmissible spongiform encephalopathies). In some situations, the issue about GM may be no different from that about non-GM. For example, a GM animal may be used as an alternative to a non-GM animal model selected for a particular genetic trait such as a disease condition arising from malfunction of a single gene. In such cases the overriding welfare issues would be the same, based on the phenotype of the animal, rather than on the process by which it was produced. In our view some procedures allowed in the selective breeding of livestock and companion animals might fail to pass the regulatory tests that would be applied if the same modification were attempted via GM. It is important therefore that welfare is assessed primarily on the phenotype. However, GM may result in some subtle non-target changes in phenotype that impact on welfare, and this should be monitored.

BBSRC accepts that some people consider GM “unnatural” (in a pejorative sense), especially if it involves gene transfer across Kingdoms. However, we note that there is widespread acceptance of GM that inserts copies of human genes into micro-organisms e.g. to produce “human” insulin. There is no inherent correlation between natural and positive/good: cholera toxin and earthquakes are natural. Plant and animal breeding may be regarded as unnatural because it is driven by human design for the benefit of humans, rather than by natural selection, but most people find this acceptable.

### **3. What is your view about the use of alternatives?**

By supporting current legislation (see below) we implicitly support the view that alternatives should be used when possible, although, as stated in answer to Q1, we recognise that the use of animals is needed in many areas where there are no alternatives.

Recent advances in cell and molecular biology, and in mathematical modelling of biological processes, appear to offer new opportunities to replace some animal experimentation. BBSRC is encouraging research in such areas through a cross-Research Committee priority area “Replacing and reducing the number of animals used in research” under which we are currently supporting a small number of awards totalling over £1M.

In our view, innovation in developing alternatives is most likely to arise from the mainstream of world-class and broad-based fundamental research, rather than from more directed activity. Indeed, several research projects already funded by BBSRC through its standard funding procedures are producing results relevant to the development of alternatives, although this is not their primary objective. An example is the application of functional genomics, where the use of chicken cells and fertilised eggs might be alternatives to some experiments involving mice embryos – for instance, the DT40 cell line derived from chicken lymphoblasts can be used to examine the role of genes in metabolism and cell division using an efficient gene knock-out system. Other examples could be the potential for using cultures of stem cells, as alternatives to animals, in the early stages of testing putative new drugs in order to screen out unsuitable compounds, so that a smaller number of candidates require statutory testing on animals.

While we support the concept of a more integrated approach to research on replacing and reducing the number of animals used in biomedical research (we are a co-funder of the Centre for Best Practice for Animals (CBPAR) at the Medical Research Council) we consider it important that such research should be within mainstream research, not separated from it, and that care must be taken to ensure that any initiative to focus on 3Rs research does not inadvertently deflect attention from the opportunities that can arise serendipitously from basic research. There may be a case, however, for a separate route for exploring more applied approaches to alternatives that seek to develop ideas from basic research specifically for use in regulatory testing, and which would complement the basic research funded by BBSRC.

### **4. What is your view about the ethical issues relating to the use of animals in research?**

BBSRC takes very seriously the need for ongoing review and consideration of welfare and other ethical issues about the use of animals in research. It has procedures that require grantholders to consider a range of ethical and other social dimensions to their work and to provide plain English summaries of how they are addressing them. We recognise that many of the ethical issues are complex, and we make efforts to identify and respond to the breadth of public opinion about the use of animals in research. BBSRC is shortly to establish a new post that will strengthen its capacity in this regard.

**5. What is your view about the UK regulations on research involving animals in the UK?**

In general, The Animals (Scientific Procedures) Act 1986 works well. We are aware of the potential for improvements in some areas such as greater standardisation in the way individual Inspectors work, and in the operation of Ethical Review Processes. We are also aware that some concerns have been raised (especially by the Pharmaceutical industry) that the UK arrangements could drive some company research offshore.

**6. What do you think about the information that is available to the public about research involving animals?**

An apparent lack of public awareness of the strict regulatory procedures governing the use of animals in research in the UK suggests that better ways are needed to disseminate this information. BBSRC encourages the researchers it funds to engage with the public on research, but we recognise that in the case of research using animals many may feel constrained by concerns for their safety, and that of their families. As in many areas of contemporary bioscience, we consider it important to promote constructive debate and avoid polemical approaches. BBSRC has commissioned and published a number of documents that attempt to encourage and inform such debate. These include a discussion document of ethical and moral issues raised by animal biotechnology.

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