

not always pull in the same direction as welfare considerations and they have led to some particular dilemmas in the welfare of broiler breeders.

Broilers have been selected for many years for very rapid growth to slaughter weight and currently reach this weight (about 2.1 kg) in 40 days. However, the growth rates of the birds used as parent stock has to be considerably restricted because such rapid growth rates result in a poor survival and a variety of welfare problems in birds which survive beyond 40 days. Growth is kept in check in these birds by limiting food intake and one of the major concerns in broiler breeder welfare is that restricting food intake to well below appetite levels in these birds may give rise to suffering through chronic hunger. A similar problem occurs with the elite pedigree stock (the great-great-grandparents of the parent stock). They are allowed to feed *ad libitum* and grow rapidly for the first 6 weeks of their lives at which time they are selected for breeding as pedigree stock on the basis of a suite of measures of performance and fitness. The growth rate of those selected has then to be strictly controlled by food restriction so that the birds will be fit for breeding when they reach about 18 weeks. These are potential welfare challenges peculiar to the broiler industry. FAWC accepts that some degree of food restriction is essential for the welfare of the parent stock – but recommends that birds should be allowed to grow at not less than 7 per cent a week and that, as a matter of urgency, research should be carried out to establish the point at which feed restriction creates hunger that birds cannot cope with, and to explore ways to alleviate hunger. With regard to the elite pedigree stock, FAWC's recommendations include companies finding the best means of minimizing the number of birds subject to detailed performance selection testing; and giving consideration to the need for the process.

Other matters considered in the report include: stockmanship, housing and the environment, stocking density, genetics, mutilations, health and disease, and catching and transport. Some 50 recommendations are made, including five on topics for future research and development. Apart from the previously mentioned recommendations concerning hunger assessment and how it may be avoided, these include recommendations for studying environmental enrichment, research into the prevention of injurious pecking, and into the improvement of welfare (particularly the problems of prolonged hunger) through selection. These are important issues some of which, providing the necessary funds become available, will represent considerable challenges for the research community.

This report maintains FAWC's standards of clarity and presentation. While of particular importance to those in the industry, these reports deserve to be read by a much wider community.

FAWC Report on the Welfare of Broiler Breeders (1998). Farm Animal Welfare Council: Surrey. 38pp. Paperback. Obtainable from the publishers, Ministry of Agriculture Fisheries and Food (MAFF), Government Buildings, Hook Rise South, Tolworth, Surbiton, Surrey KT6 7NF; or from MAFF Publications, Admail 6000, London SW1A 2XX. Free.

Refining laboratory mouse husbandry

The available statistics suggest that some 7 million mice are used annually for scientific procedures in the European Union. More mice are used than any other species. There has been a great deal of attention given to application of the '3Rs' (replacement of animal use, reduction of numbers used, and refinement of techniques) in scientific procedures but there may be room for considerable further improvement in the quality of animals' lives through improved husbandry. In view of this, about 10 years ago, the British Veterinary Association Animal Welfare Foundation (BVAAWF), the Fund for the Replacement of Animals in Medical

Experiments (FRAME), the Royal Society for the Prevention of Cruelty to Animals (RSPCA), and the Universities Federation for Animal Welfare (UFAW) established a Joint Working Group on Refinement tasked with arranging working parties to define improvements in the husbandry of laboratory animals. This is the third report produced by the Joint Working Group (previous reports covered the removal of blood and rabbit husbandry). The 14 authors comprise experts in a variety of aspects of murine biology, care, and welfare.

The report includes sections on the relationship between husbandry and the purpose of the procedure, the natural history and behaviour of mice in relation to their husbandry, husbandry, health and quarantine, catching and handling, identification, balancing supply and demand, transport, special problems of containment systems, genetically modified mice, wild mice, and areas for further research. A full list of references is provided. Each section has been well researched and considered and the Working Party's summaries and views are well laid out and clearly written. Where appropriate, chapters end with a list of specific recommendations.

Although the Working Party was able to make many practical recommendations for improvements in laboratory mouse husbandry, they also concluded that '...there is still a lot of research necessary to establish how current systems could be modified to satisfy the physical and psychological needs of mice in the laboratory...'; and also that there is an urgent need for evaluation of alternatives to current systems. More specifically, the report identifies several topics in need of research and these include: cage size, cage and substrate materials, cage cleaning, lighting regime, and assessing welfare.

This is a very valuable contribution to the literature on mouse husbandry and welfare. The aim of the Working Party is that this report will be widely circulated and be adopted as current best practice.

Refining Rodent Husbandry: The Mouse. Report of the Rodent Refinement Working Party (1998). *Laboratory Animals* 32: 233-259. Reprints obtainable from RSPCA, Research Animals Department, Causeway, Horsham, West Sussex RH12 1HG, UK (research_animals@rspca.org.uk). Free.

Transgenic fish for food and science

It is likely that, under natural conditions, selection for fitness and good feelings are closely coupled. There would, under most circumstances, be no evolutionary advantage for an animal to feel good when its fitness was poor or threatened and, likewise, generally nothing to be gained by feeling bad when fit. In fact, there would be strong selection pressure against such mismatches of feelings and fitness. Pain must hurt enough to serve its purposes such as the guarding of damaged tissues and the provision of sharp lessons about things to be avoided, but not so much that it unnecessarily interferes with other body-maintenance functions such as eating and avoiding predators. Natural selection probably 'scrutinizes' the intensities of pleasures and pains very closely and keeps them tightly linked to health and evolutionary fitness.

When assessing the welfare of wild animals, good health (both physical and mental) is therefore likely to be a useful indicator that feelings are generally towards the more pleasurable end of the spectrum and thus (for those who believe welfare is largely about feelings) that welfare is good. In animals selected for particular characteristics such as rapid growth, high yields or indeed anything else, there is always a possibility that feelings and fitness may have become uncoupled so that an animal that is unfit may feel fine; or worse, that an animal which appears fit (say in terms of growth or yield) may not feel so. This is problem enough with animals whose genetics have been modified by traditional breeding techniques but might the potential for such uncoupling of fitness and feelings may be greater in transgenic animals? It is this possibility which makes any assessment of the welfare of transgenic animals very difficult.