

primates spend on the protocol and to ensure that time and resources are not wasted it may be best to move the animals as soon as possible to the highest level of fluid control (in which the animal is trained to the task and receives most of its daily fluid requirements during task training) although once trained some relaxation may be possible.

It is also noteworthy that despite the emphasis in the initial consultancy exercise on the need to use animal-based measures of welfare, the reasons provided by respondents for reporting diminishing levels of severity related to resource provision: *viz* successful re-housing of the subject with one or more cage mates, moving the animals to larger cages and providing swings and ropes, providing a playpen and improving the cleaning regime. Again, the inconsistency may have arisen because there were not good animal-based assessments available to the researchers in this retrospective exercise. Fortunately, under revised UK legislation in which retrospective assessment of these types of study is required, there should be better data in the future.

The report does, however, provide the first data-based study of cumulative severity and the Primates Sub-Committee of the Animals Procedures Committee should be commended for this. The report also makes many interesting points that will help to advance the debate. It draws attention, for example, to the various possibilities that the effects of procedures on severity may be either non-additive with complete recovery between events, non-additive with habituation between events, additive with partial recovery between events (stacking up) and additive with compounding by the effects of previous procedures. It also makes the interesting point that there is clearly a distinction to be made between Moderate, Multiple moderate without significant impact on welfare, and Severe. Additionally, the report provides many useful recommendations that could improve the welfare of primates used in neuroscience, including the wider use of CCTV to provide better monitoring of the animals; the use of timelines recording the incidence of procedural events, which can be used with eg veterinary records to assess the impact of life events; the need for research on the psychological effects of fluid control regimes on non-human primates; the need to spread best practice; and the need to continually assess animals for their suitability, and continued suitability for research.

Review of the Assessment of Cumulative Severity and Lifetime Experience in Non-Human Primates used in Neuroscience Research (2013). Report of the Animal Procedures Committee's Primate Subcommittee Working group Chaired by Professor John Picard FMedSci Available at <https://www.gov.uk/government/publications/animal-procedures-committee-cumulative-severity-review>.

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FeatherWel: practical strategies to reduce the risk of injurious pecking

FeatherWel is an information resource which provides advice on practical measures and strategies to reduce the risk of injurious pecking in non-cage laying hens. Injurious pecking is a common problem in these hens. The consequences can range from relatively minor feather loss to serious damage to living tissue leading to death.

It can be a difficult problem to predict and prevent. The FeatherWel website provides information about the problem and about measures that can be taken to tackle it or minimise the risks.

The advice, produced in consultation with a wide range of experts, is based on the results of a four-year project at Bristol University, funded by the Tubney Trust. This compared the prevalence of injurious pecking in 50 flocks in which various forms of intervention were made to prevent or ameliorate pecking, with its prevalence in 40 control flocks (the Bristol Injurious Pecking Programme: www.bris.ac.uk/vetscience/research/projects/peckingproject/).

The guidance addresses various risk factors. Although there is no certain cure for the problem: "... recent studies have shown the *more proactive the management* of a flock, the less likely it is to show high levels of injurious pecking." This is a clearly presented and easy to read, science-based, package to help egg producers tackle and avoid the problem. Although based on research carried out on flocks in the UK it seems likely that it will be helpful much more widely.

FeatherWel: Promoting Bird Welfare (2013). An information resource led by the University of Bristol, supported by the RSPCA, the Soil Association, AssureWel, and the British Egg Industry Council. Available at: <http://www.featherwel.org/>.

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Tackling livestock effects on climate change

The impact of global warming on animal welfare is likely to be complex and hard to predict. Among wild vertebrates, individuals of some species may benefit, some may be little affected, but those of species that are sensitive to temperature but which will not (eg for geographical reasons) be able to move, will be adversely affected. This will involve large numbers. Likewise, in the long run, global warming may adversely affect many kept animals also.

In its recent review of the role of farmed livestock on global emissions, the FAO calculated that the world's livestock produce 7.1 gigatonnes of CO₂-equivalents per year, which is equal to 14.5% of all anthropogenic greenhouse gas (GHG) emissions. It is concluded that the livestock sector plays an important role in global warming.

At present, cattle contribute the largest part of these emissions (41 and 20%, respectively, from beef and dairy cattle), with pigs and poultry (meat and eggs) contributing 9 and 8%. However, the latter will increase as pig and poultry production continue to grow rapidly in response to rising demand.

The FAO believes that considerable improvements should be possible and that if farmers all adopted the systems used by those which have the lowest rates of GHG emission, there would be a 30% overall reduction. There is a direct link between GHG production and livestock production efficiency, so efforts to reduce GHG emissions are: "... to a large extent, based on technologies and practices that improve production efficiency at animal and herd levels. They include the use of better quality feed and optimising feed formulation to reduce enteric and manure emissions" and will result also from: "Improved breeding and animal health help to shrink the herd overhead (ie unproductive part of the herd)". The final part of the report considers policy approaches to driving the measures needed to bring about reductions in emissions.

The report does not address animal welfare aspects. It seems likely that some efforts to reduce GHG emissions (eg

improving efficiency through better animal health) will tend to be good for welfare also. However, concerns for welfare may not always pull in the same direction as concerns to minimise GHG emissions. For example, selection of dairy cattle for increased milk production will tend to reduce GHG production per unit of milk produced, but might increase welfare risks.

This is a detailed and informative review of the role of livestock in greenhouse gas emissions and of steps that could be taken to ameliorate the scale of the problem (within the context of its assumption that there will be continued growth in demand for livestock products).

Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities (2013). A4, 139 pages. Gerber PJ, Steinfeld H, Henderson B, Mottet A, Opio C, Dijkman J, Faluccci A and Tempio G Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Available at: <http://www.fao.org/docrep/018/i3437e/i3437e.pdf>.

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