Reports and Comments

The 3Rs principles and the validity of scientific research

The Permanent Senate Commission on Animal Protection and Experimentation of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) has recently published guidelines on the design, planning and implementation of scientific experiments involving animals. The DFG state: "To ensure both the highest scientific quality and high animal welfare standards in animal experimentation, animal welfare policies and scientific validity must be seen as integral parts of project design".

The guidelines are divided into three main sections, the first section considers the relationship between the welfare of animals used in research and the scientific quality of the research. It is increasingly recognised that the welfare of laboratory animals impacts on scientific results and the DFG maintain that: "High animal-welfare standards are a prerequisite for high-quality research". The 3Rs principles are used as the guiding criteria when considering animal welfare throughout the guidelines and the guidelines are therefore limited to aspects of the 3Rs which are relevant to the design, planning and implementation of research projects.

The second part of the guidelines — *More than 3Rs: The 3Rs Principle and Scientific Validity* — highlight that it is not enough to simply implement the 3Rs when designing an experiment: "Careful implementation of the 3Rs is necessary but not sufficient prerequisite for the ethical justification of animal experiments". The study design itself must be objective, valid and replicable, regardless of the severity of procedure. "Fundamental to every researcher's responsibility is the assurance of scientific quality with the aim of maximising scientific validity". Three aspects of scientific validity are considered important when evaluating the suitability of animal experiments: construct validity (validity of the animal model or experimental model/methods); internal validity (cause-effect relationship); and external validity (the degree to which experimental results can be generalised).

The final section describes how tension may exist between the 3Rs and scientific validity. Areas of tension can occur during: selection of animal species; determination of the number of animals; standardisation; pilot studies/exploratory experiments; and replication of experiments. For example, although a reduction in the number of animals used in experiments is desirable, experiments below a certain sample size have little value due to a lack of statistical power. The guidelines provide various solutions on how researchers may reduce animal numbers without diminishing the scientific validity of an experiment as well as suggesting that for more complicated experiments it is advisable to enlist the help of a biostatistician proficient in animal experimental design.

The guidelines close with a useful Appendix that lists web links to reporting guidelines (ARRIVE, HARRP PREPARE); databases for pre-registration of animal experimental studies; and general information on the 3Rs, experimental design and G*Power.

Animal Experimentation in Research: The 3Rs Principles and the Validity of Scientific Research (July 2019). A4, 18 pages. Guidelines of the Permanent Senate Commission on Animal Protection and Experimentation of the DFG for the Design and Description of Animal Experimental Research Projects. Available online at: https://www.dfg.de/en/dfg_profile/statutory_bodies/senate/animal_protection/index.html.

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FAWC Opinion of the welfare of cattle kept for beef production

The Farm Animal Welfare Committee (FAWC) periodically issues Opinions to advise Government bodies within the United Kingdom on subjects that they believe to be of particular importance to farm animal welfare. The latest report examines the welfare of cattle kept in a range of beef production systems, from rearing through to the point of slaughter.

Evidence was gathered by conducting a review of relevant literature, stakeholder consultation, farm visits and interviews — the aim being to recognise good practice, and to highlight areas where cattle welfare may either be improved or threatened.

FAWC identified many overarching issues that affect all beef production systems and describes these under the following headings: 'General industry issues' (such as poor access to experienced livestock veterinary services, little vertical integration of the industry resulting in increased movement of animals, and poor co-operation in the beef supply chain); 'Disease' (including low uptake of disease vaccination/eradication programmes, large variation in biosecurity measures, and the increasing resistance of parasitic organisms to treatment measures); 'Livestock markets and collection centres' (20% of finished animals and the majority of store animals are sold at livestock markets and therefore exposed to multiple journeys, increased biosecurity risk and variable welfare at the market or collection centre depending on quality of handling, access to feed/water, mixing); 'Housing and handling' (such as decades of underinvestment in buildings and infrastructure); 'Transportation' (eg stress during gathering, loading, transport, unloading, as well as an increase in transport time due to a diminishing number of markets and abattoirs and some retailers only accepting animals from certain abattoirs); 'Breeding practices' (including dystocia, which occurs in approximately 6% of calvings and double-muscling which may necessitate birth via Caesarean section) and 'Fallen stock' (services for dealing with fallen stock range in speed of response and cost depending on area).

Universities Federation for Animal Welfare　　UFAW　　*Science in the Service of Animal Welfare*