

The re-use of animals for research—a humane endpoint?

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Summary

The usefulness of definitions of re-use is examined and some of the ethical and scientific advantages and disadvantages are discussed with examples.

The re-use of animals for research can be defined as the sequential use of the same animals for unrelated animal experiments. In some countries this is common practice for species that live long or are valuable or hard to obtain. However, there are no reliable data on re-use, as it has not been covered in any annual reporting on the use of laboratory animals to administrative bodies, except in the UK, nor is it commonly reported in the publication of scientific work. Several new technological developments might even encourage the re-use of animals, e.g. with animals that are instrumented with telemetric devices. Thus, it may be useful to discuss the re-use of animals for research from the perspective of humane endpoints.

Why are animals re-used?

The re-use of animals may be driven by practical and economical considerations, but there are ethical considerations in favour as well as against re-use. Laboratory animals are moral subjects, which implies a moral obligation for humans to take good care of them. As with any other domestic animals, humans should avoid any unnecessary reduction in their welfare, and avoid unnecessary killing (Donnelley *et al.* 1990, Smith & Boyd 1991). When an animal is in good health after an experiment it may be kept for future use. This policy may result from a bond that has developed between caretakers or investigators and the animals concerned (Bekoff 1993).

It also implies that fewer animals have to be bred and kept to provide animals for research purposes. Thus, not to kill but to re-use animals may be ethically justified.

Why should re-use be avoided?

The main reasons for avoiding re-use are ethical and scientific. Accumulated discomfort in animals should be avoided if it becomes substantial. Also, when animals are kept in stock after an experiment has ended, their environment should be enriched sufficiently to avoid detrimental boredom (Wemelsfelder 1995). It is also not often possible to return animals to the social group that they were with. Scientific considerations that discourage re-use include a lack of definition and standardization of animals that have been used before, and significant differences in the background or history of the animals might lead to the use of larger numbers of animals and with less reliable results.

Definitions and legal restrictions

Both European (Directive 86/609 EEC) and North American (Animal Welfare Act 1966, etc.) legislation on the use of animals for research set limits that imply that repeated major procedures on the same animal are not allowed if different animals could equally have been used, i.e. if there was no scientific necessity to use that animal. This ruling is to

prevent accumulated discomfort in animals if this is not inevitable within a single experiment. European legislation also states that:

'At the end of any experiment, it shall be decided whether the animal shall be kept alive or killed by a humane method, subject to the condition that it shall not be kept alive if, even though it has been restored to normal health in all other respects, it is likely to remain in lasting pain or distress.' (Article 9.1)

Practical cases

The definition of re-use may seem very clear but is not always unequivocal and may even be counter-intuitive when considering the optimal use of animals. For example, animals are sometimes instrumented to provide easy access for sampling (e.g. with permanent vascular cannulae, or cannulae for the collection of digesta) or to measure physiological functions (e.g. with telemetric devices). These techniques aim to study the animal in an undisturbed way, providing for adequate data sampling and less discomfort from repeated handling, restraint and invasive techniques. Thus, these instrumentation techniques are commonly regarded as refinements, but the surgery required for their placement is invasive and requires general anaesthesia and may cause post-operative pain. However, once an animal is successfully instrumented and shows normal physiological parameters, it becomes rather attractive to use it for different investigations sequentially. One could then apply the definition of re-use from two different perspectives. One is that the research requires an instrumented animal and that any other (non-instrumented) animal is not suitable. In that case, there is by definition no re-use, even if the studies done on that same animal are unrelated and performed for different purposes. The other perspective is that the surgical intervention was part of the study proper, and that another animal could be instrumented as well. In that case, extended use of an instrumented animal for different

purposes is considered as re-use and should not be done if the discomfort in the sequential studies is substantial. Other animals should be operated upon instead. Another practical example is in the training of animals for a task. This is seldom successful in all the animals taken into the programme but, once the animals are trained, it is very attractive to use those animals for more than one study. Again, both lines of reasoning can be followed.

In conclusion, the definition of re-use does not always provide guidance on the ethical treatment of animals.

The endpoint of a study

If animals are kept alive after a study has ended, there are several options. One is to kill the animals humanely, as is routinely done with laboratory rodents and other small species. An alternative is to keep the animals. Sometimes animals are 'retired' for their own sake, but generally their destiny is one that is useful to their owners, such as further experimental use or breeding. The animals could also be given, or sold, to private persons or professional third parties (e.g. farms or zoos); typically, farm animals are slaughtered for meat. However, in all cases, the endpoint needs to be considered carefully and any permanent damage to the health or well-being of the animals should prohibit any subsequent use.

When considering the subsequent experimental use of animals, the following should be considered: their physical and psychological health and well-being, the realistic options for their further use, including the validity of the intended studies, and the quality of care and husbandry that can be provided for the animals, with special emphasis on environmental enrichment.

The management of re-use

Many parties are involved in maintaining a programme for re-use. There should be adequate data management to provide the individual case history of each animal: the health and well-being of each animal should be monitored carefully, including the assess-

ment of its coping with stress and its adaptation to new circumstances. This requires close attendance by caretakers and veterinarians. The animal ethics committee should be asked for an accurate evaluation of the endpoint of each study and also the proposed re-use of animals. Last, but not least, the investigators should consider carefully the case history of the animals to be re-used from the viewpoint of its scientific acceptability.

Conclusions and recommendations

The re-use of animals can be considered a humane endpoint if the animals remain fit and healthy and if the accumulation of discomfort from unrelated studies is restricted effectively. The management and review of re-use should meet that end. More information on the practice of re-use is needed to allow for better evaluation. The editors of scientific journals should require the reporting of any previous experimental use of the

animals that have provided the scientific data in articles submitted to them. Unfortunately, this is not the case at present. Secondly, any re-use should be reported in the annual reports that licensed institutions are required to send to the official authorities in their country. This will be done in The Netherlands, starting in 1998.

References

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