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RESEARCH AND ANIMAL EXPERIMENTATION IN SWITZERLAND: ANIMALS NOT USED FOR EXPERIMENTS ("SURPLUS ANIMALS")

To improve scientific knowledge in life sciences and to find new treatments for human and animal diseases, e.g. for cancers, diabetes, rare diseases or emerging infections and the development of vaccines, fundamental and preclinical research need animals with specific characteristics. This is achieved in many cases by using genetically modified animals, that enable tailored research into numerous biological processes and diseases and the development of new therapies. This method optimises research results.

Annual statistics about animal experimentation are published by the Federal Food Safety and Veterinary Office (FSVO). The FSVO publishes two types of figures: the number of animals used for experiments and the number of animals in facilities, either born (counted at the time of weaning) or imported. In the past years the majority of surplus animals consists of mice. The main reasons, among others, are:

- Need for animals with **specific genetic modification(s):** the largest number of unused animals comes from genetically modified mouse strains (~80% of genetically modified mice bred/imported are not used). Not all offspring inherit the desired genetic modification(s) due to the laws of heredity. Not all of these animals can be used for research, creating a "surplus". The more genetic modifications are needed, the higher the breeding surplus.
- Need of one **sex** only (e.g., studies on prostate cancer and other sex specific diseases). In this case, the not-used sex could in principle be available for other studies; however, because laboratories often focus on a specific field of research, it may be impossible to use these mice for a different purpose.

Possible measures to reduce the number of surplus animals

To reduce the number of surplus animals as much as possible, efforts are being carried out at several levels:

- **Breeding management**:
    - Continuous development, monitoring, and improvement of breeding strategies, using biostatistical tools and dedicated software (for example at UZH).
    - Use of advanced technologies of genetic modification (e.g., CRISPR/Cas 9) to streamline the breeding process and facilitate quicker generation of

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animals with complex genetic modifications (for example at ETH Zurich with a 3RCC-funded project).

- **Cryopreservation**, the freezing and storing of animal embryos and sperm, offers researchers the flexibility to optimize and align animal breeding with the needs of the research project.
- **Use of both sexes** whenever possible, and good coordination between research groups from different research fields to optimize the number of animals even in experiments that only require one sex.
- **Sharing of lines** between research groups whenever possible.
- **Limitation of in-house breeding** of commercially available animals.

In the continuing effort to minimise the number of animals bred but not used in experiments, the combination of these measures with the collaborative efforts of all partners involved in animal experimentation within the institutions is key (see the successful initiative set up at University of Basel).

Alternative uses of surplus animals

- Sharing of surplus animals and tissues of killed animals between research groups for other experimental purposes through dedicated programs, such as Animal Sharing at UZH or OptiMice at EPFL.
- Rehoming of surplus animals as pets for retirement in private homes or shelters. Research institutions have developed specific programmes to rehome healthy animals by working closely with animal protection organisations (for example at EPFL, UZH and UniBE). However, genetically modified animals cannot be rehomed due to legal restrictions.
- Re-allocation:
    - Use for training, e.g. for mandatory training of researchers performing animal experimentations.
    - Use as feed: euthanised non-genetically modified surplus animals can in some cases be used to feed reptiles, birds of prey and other animals from zoos, animal shelters and rescue centres and private pet owners.

Why surplus animals have to be killed

If no alternative use is possible, surplus animals must be humanely killed. Most of these animals are mice and rats, for which CO_2-mediated euthanasia is mostly used. This method can be safely applied by researchers and caretakers, without the need for invasive interventions (e.g., injection of a substance that induces additional stress). Several animals can be killed at the same time in their home cage, reducing the stress on the animals and on the person responsible for the killing. However, it is a matter of debate if CO_2 for rodent euthanasia still causes disproportional degree of distress, which is why research is ongoing in Switzerland and worldwide to find alternative techniques with the overall goal of reducing (or suppressing) aversion and stress before loss of consciousness.

The topic of humanely ending the life of animals has been under the scrutiny of the FSVO for several years and continues to be discussed at (international) symposiums including actors from different institutions and associations.

Additional factsheets on the same topic

- Animal Welfare Officer network (AWO-N) statement on surplus animals and CO_2.
- Animal Research Tomorrow (ART) flyer on surplus animals.
- Factsheet (in German) from *Tierversuche verstehen* about extended statistics on animals in research.
- Factsheet (in German) from *Gesellschaft für Versuchstierkunde* (GV-SOLAS) on the reduction of the number of non-usable animals in the breeding of laboratory animals

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