Even the surplus animals count

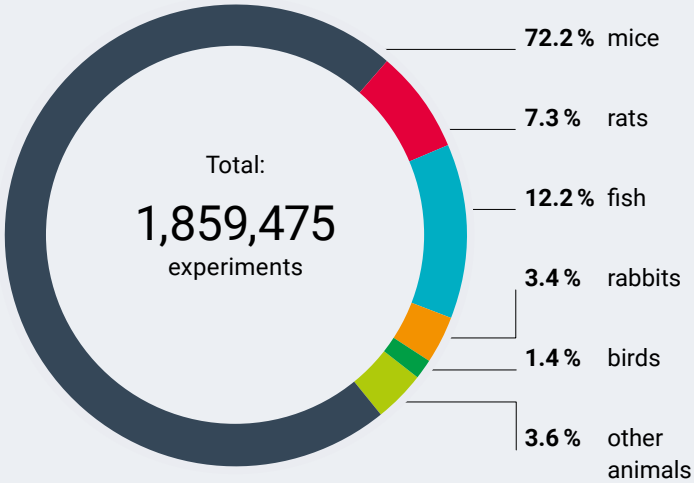
Most laboratory animals are not used in experiments at all. What can be done to reduce their number?

Cancer is the destructive proliferation of the body's own cells. The cause is fundamental changes in the cells' genetic material. These mutations have to be researched if the disease is to be understood and fought successfully. One approach to this is genetically modified mice. They make it possible to study the development of cancer and prepare the development of new therapies and drugs. To put it simply: it is hard to imagine modern cancer treatment without animal experiments. However, not all genetically modified mice bred for experimental purposes are suitable. One reason is that, according to Mendel's laws of inheritance, only a quarter of the offspring are homozygous for a desired genetic trait, meaning three out of four mice in this scenario are "surplus". There is often no further use for them in scientific work.

This example is just one of many reasons on the subject of surplus laboratory animals not used in an experiment. Others include the animal being the wrong sex or an unsuitable age. Until now, surplus laboratory animals have mostly been killed. "The scientific community and the public are only gradually becoming aware of the issue," says Professor Dr Gilbert Schönfelder, head of the German Centre for the Protection of Laboratory Animals (Bf3R) at the German Federal Institute for Risk Assessment (BfR). This is responsible for summarising and publishing laboratory animal numbers in Germany. "More solutions are needed so that fewer surplus animals are produced," says Schönfelder.

Animal experiments

Numbers for 2021



SURPLUS ANIMALS ARE IN THE MAJORITY

For the first time in 2022, the BfR published the numbers of surplus laboratory animals or animals killed for other reasons for the reporting year 2021. The animals are mainly mice (86 percent), zebrafish (twelve percent) and rats (1.5 percent). With around 2.6 million animals, their number exceeds the animals actually used in experiments and for scientific purposes (2.5 million). From now on, the BfR will summarise and publish these figures, which are reported annually by the German federal states ("Laender") – an important step towards transparency, Schönfelder believes. The EU only publishes relevant information every five years. According to the most recent survey, around 12.6 million surplus animals were killed here in 2017, significantly more than in experiments (9.4 million). It is not known how high the number is worldwide (or in large nations such as the USA and China). One thing is certain: surplus animals are in the majority.

How we deal with laboratory animals reflects the social changes of previous decades. During this time, there has been increased awareness of the fact that vertebrates can feel pain and suffer. In Germany, this appreciation has led to animal welfare enjoying constitutional status for the last 20 years by being included in Article 20a of the Basic Law. This means that animals are recognised as a creature worthy of protection and possessing an "intrinsic value". For science, this means committing to animal welfare together with society.

The fact that animal welfare is playing a growing role is illustrated by a ruling made by the Federal Administrative Court in 2019. It bans the killing of day-old, male chicks that are unsuitable for egg and meat production, which is a common practice in poultry farming. The court refers to the German Animal Welfare Act. It protects the life and well-being of every animal as a fellow creature. And what's more: the law also does not allow pain, suffering or harm to be inflicted on the animal if there is no "reasonable cause" to do so.

A "REASONABLE CAUSE" – ALSO TO KILL

A "reasonable cause" must be valid, comprehensible and supported by a legitimate interest that outweighs the animal's interest in its integrity. Anyone who violates the law faces imprisonment of up to three years or a fine. However, there is no clear definition of what exactly constitutes a reasonable cause. It must be examined on a case-by-case basis. As in the case with the day-old chicks. The court saw no reasonable cause for their death.

"This unclear situation (...) may lead to Germany having a competitive disadvantage when it comes to research."

PROFESSOR DR GILBERT SCHÖNFELDER, BFR

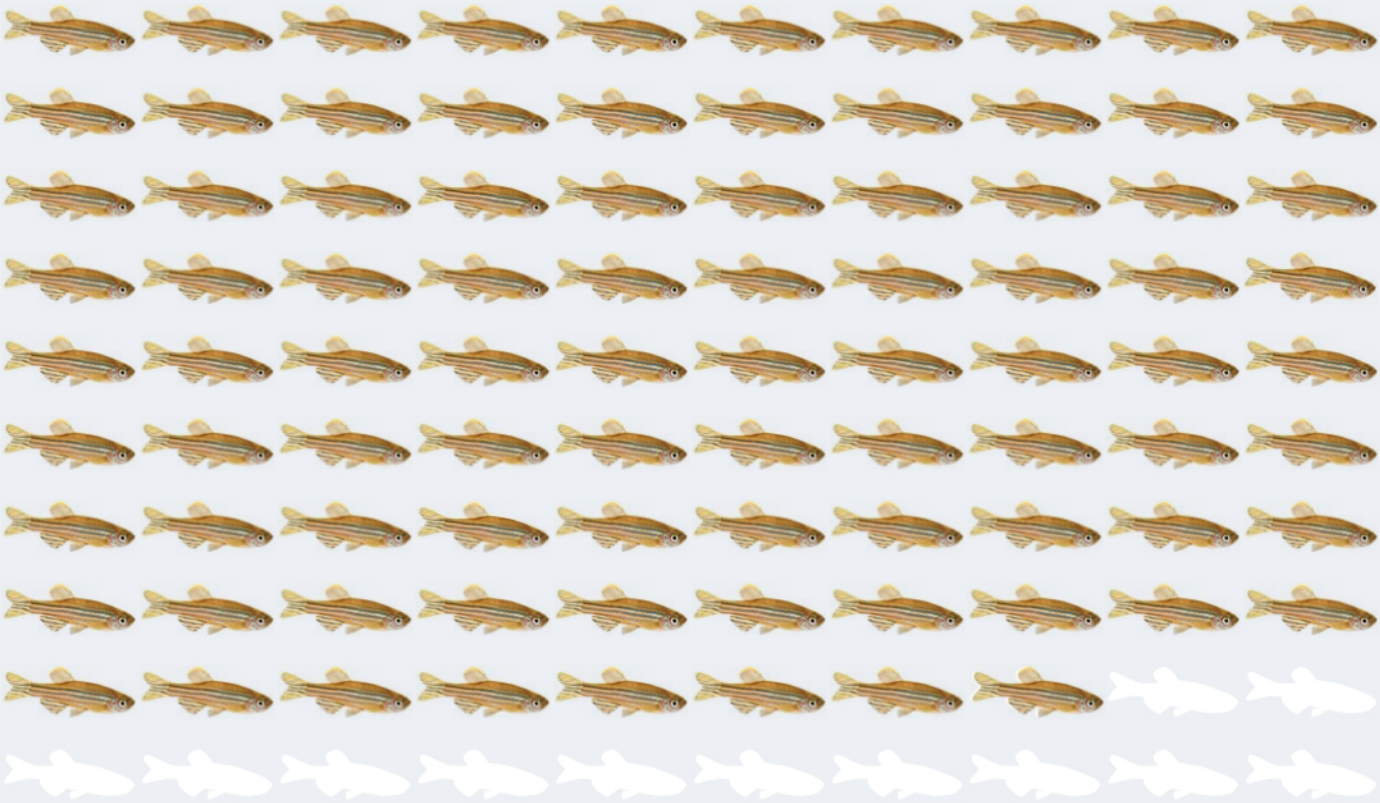
Killing chicks has been banned in Germany since 2022. This raises the question: what actually happens to surplus laboratory animals? What is the reasonable cause for killing them? Motivated by the ruling on killing chicks, German animal welfare organisations have gone to court and filed charges against various laboratory animal facilities. The accusation: violation of the German Animal Welfare Act since no reasonable cause exists.

"This unclear situation creates uncertainty in the scientific community," says Schönfelder. "It may lead to Germany being at a competitive disadvantage in research, to scientists leaving the Federal Republic or moving their experiments to other countries." He refers to the fear that surplus laboratory animals kept until the natural end of their life could lead to high resource consumption and a research blockade.

WAYS TO REDUCE THE SURPLUS

A retirement home for mice? Schönfelder emphasises that the focus should not be on this kind of solution. He suggests measures to reduce surplus laboratory animals in institutions (see box on the right).

"Another possibility is vertebrate-free experiments, for example, on the nematode *C. elegans* or the fruit fly *Drosophila*," says Schönfelder. "And, of course, exper-



In the case of zebrafish, 12 percent are surplus animals; for mice (previous page), only one in seven laboratory animals is used

iments with cell cultures and novel 'organ chips', such as miniature kidneys or livers, may also be more effective in the future." Despite the developments in alternative methods and breeding techniques, it will not be possible to completely avoid surplus animals. So, what should we do with them? Apart from permanent housing, they could be given to interested parties or used as animal feed. However, in the case of genetically modified animals, the latter is hindered by considerable regulatory hurdles in the EU and is, therefore, not practised. Still, the discussion around surplus laboratory animals is ongoing. And that's what counts. —

More information

Wewetzer, H. et al. **The fate of surplus laboratory animals**. EMBO reports. E56551. DOI: 10.15252

BfR FAQ
"Alternative methods and laboratory animals"

FEWER SURPLUS ANIMALS? WHAT CAN HELP

- Keep animal colonies (e.g. of mice) as small as possible
- Freeze eggs and sperm so that animals are produced only when needed
- Genetic testing of gametes so that only animals with the required genetic material are bred
- Use of new techniques such as the CRISPR/Cas9 "gene scissors", with which targeted genetic changes are possible
- Experiments should not only be carried out with male animals, but also with females
- Older laboratory animals could also be used