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UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

The **2024** annual report on animal research

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1. Foreword

In recent years, Switzerland has made remarkable progress in advancing biomedical research and hazard testing to improve human health, while also pioneering innovative approaches that align with the 3Rs principles of Replacement, Reduction, and Refinement. These principles, first described by William Russell and Rex Burch in *The Principles of Humane Experimental Technique* (1959), call for (1) replacing animal experiments with alternative methods, (2) reducing the number of animals used, and (3) refining practices to improve animal welfare.

At the University of Fribourg, our research community is not only aware of the 3Rs principles but also deeply committed to putting them into practice. We recognise that there are many ways to do so – through improved experimental design, better welfare measures, and the adoption of sophisticated *in vitro* and *in silico* models. These approaches are already actively explored and implemented in many laboratories. All these efforts require transparency, reflection, and the willingness to adapt research cultures and methods. Researchers and animal-care professionals are working closely with Swiss and international research partners and policy stakeholders, helping to shape a future where high-quality science goes hand in hand with **New Approach Methodologies (NAMs)** and responsible animal use.

Through the Swiss National Science Foundation’s National Research Programme NRP 79 on “3Rs”, I had the opportunity to establish new collaborations. In February 2024, I was invited to the **symposium *Accelerating Replacement: Toward Animal-Free Science Research at Swiss Universities* at the Collegium Helveticum in Zurich**. This one-day meeting brought together experts in law, ethics, policy, and science to develop recommendations and a policy report aimed at inspiring and supporting Swiss universities in accelerating the adoption of NAMs. Discussions focused on priorities for action and pathways for implementation.

The resulting workshop report underscored the unique role universities can and should play in driving the transition toward NAMs. Key strategic priorities include: (1) positioning the 3Rs as a central institutional goal; (2) ensuring comprehensive training for students and collaborators on animal welfare, ethics, and alternative methodologies; (3) embedding ethical responsibility into research culture; and (4) establishing systems to monitor progress and guide change.

As responsible scientists, we are committed to advancing knowledge through both animal research and the development of innovative alternatives such as NAMs in line with the 3Rs. Universities also share a vital responsibility in leading research, education, and innovation. Sustained public support is essential to guarantee that scientists can continue advancing knowledge responsibly – with and beyond animal research.

Prof. Barbara Rothen-Rutishauser, Co-Chair BioNanomaterials, Adolphe Merkle Institute, Faculty of Science and Medicine, University of Fribourg

▶ Research involving animals at the University of Fribourg: www.unifr.ch/go/animals

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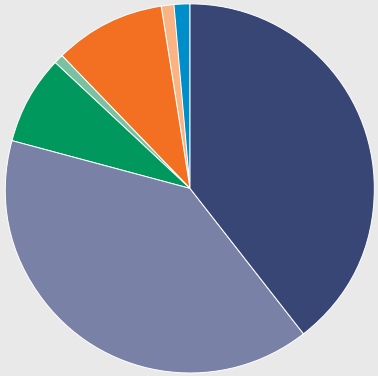
2. Figures

2.1. Numbers and species

The table below shows in detail the numbers of animals used in experiments in the calendar year 2024.

A distinction is made between genetically modified (GM) and wild-type (WT) animals.

Animals used overall, 2024



Mice WT	2007
Mice GM	2019
Rats WT	401
Rats GM	47
Zebrafish WT	496
Zebrafish GM	44
Rabbits	3
Macaques	13
Tree shrews	13
Cephalopods	40
Total	**5083**

2.2. Degrees of severity

In animal experiments in Switzerland four degrees of severity are distinguished, measuring the level of constraint from 0 to 3. Each animal experiment requires a specific authorisation issued by the Cantonal Veterinary Office and, depending on the constraints on the animals, is examined beforehand by the Cantonal Commission for Animal Experimentation.

Degree of severity 0: no constraint

If no pain, suffering, injury, or fear is inflicted on an animal during a procedure, a degree of severity 0 is assigned. This may include experiments such as behavioural observations to study the social and cognitive abilities of an animal.

Degree of severity 1: slight constraint

If an animal is subjected to slight, short-term pain or injury, or slight impairment of its general condition, a degree of severity 1 is assigned. This is the case, for example, if blood is repeatedly drawn from an animal within 24 hours in a total volume that is well tolerated.

Degree of severity 2: moderate constraint

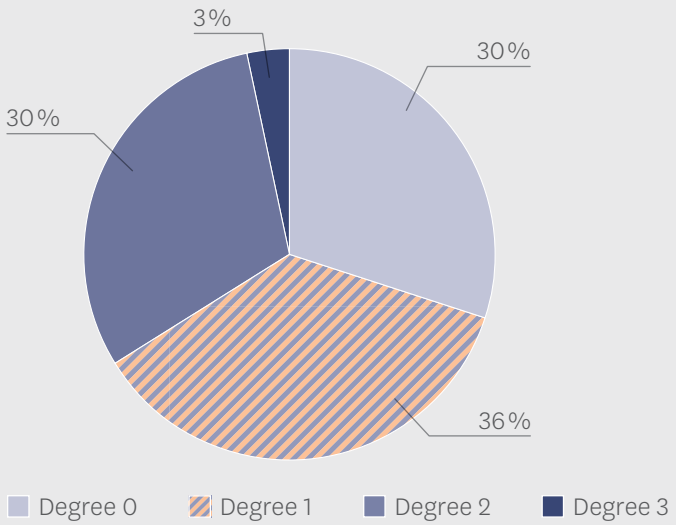
If an animal is subjected to a medium short term or a light, medium to long term constraint, a degree of severity 2 is assigned. This is the case, for example, with most surgical procedures on animals under general anaesthesia, when the postoperative pain is moderate and treated with analgesics.

Degree of severity 3: severe constraint

If an animal is subjected to severe pain, continuous suffering, significant fear, or severe impairment of its general condition, or if the constraint is moderate but persists in the medium or long term, a degree of severity 3 is assigned. Animals that unexpectedly die in the course of an experiment, even if they show no signs of illness before death, are also classified in the highest severity degree. The accumulation of different constraints of severity degree 1 or 2 each can be upgraded to the highest severity level by the cantonal authorities. Surgical procedures in the area of the chest are a typical example of degree of severity 3.

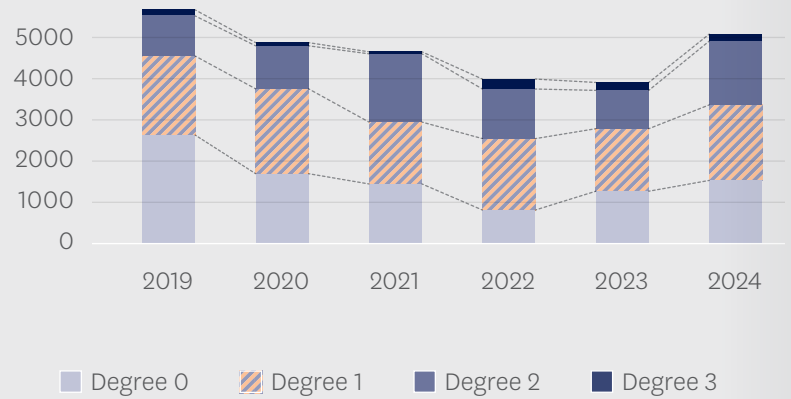
In 2024, 5083 animals were used in experiments. Two thirds of these were used in studies with a severity level of 0 or 1.

Animals used overall according to the degree of severity, 2024

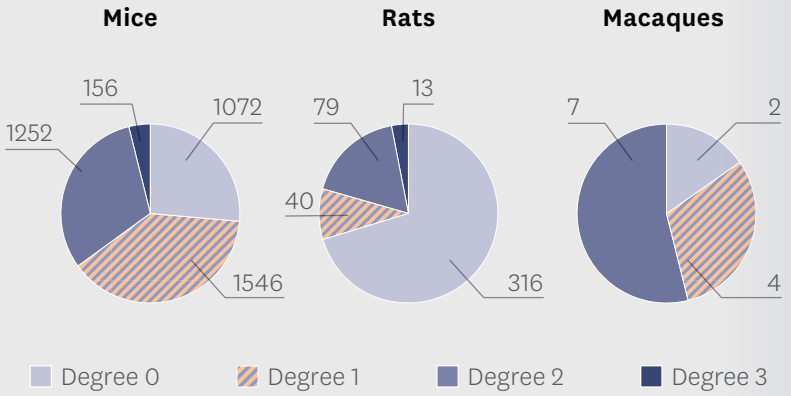


The following graphs show the evolution of animal experiments according to the degree of severity for the last five years.

Distribution according to the degree of severity, overall



Distribution according to the degree of severity, 2024



2.3. The “Three Rs” (3Rs) in animal research

Published more than 60 years ago, the concept of the 3Rs principle is today widely accepted by scientists as a moral obligation to treat animals humanely and, if possible, use alternative methods in experiments. The 3Rs stand for:

- Replacement: Methods that permit a given purpose to be achieved without conducting experiments or other scientific procedures on animals.
- Reduction: Methods for obtaining comparable levels of information from the use of fewer animals in scientific procedures, or for obtaining more information from the same number of animals.
- Refinement: Methods that alleviate or minimise potential pain, suffering and distress, and enhance animal well-being.

The University of Fribourg is committed to the ethical treatment of laboratory animals by consistently implementing the 3Rs principle. This applies to not only experimental interventions, but also the housing and handling of the animals. It also supports methods and research that can help to reduce the number of animal experiments or completely replace such experiments with alternative methods.

Through an unconditional application of the Culture of Care, all those working with animals, whether animal caretakers, veterinarians, heads of animal facilities, researchers, animal welfare officers, or management staff, contribute on a daily basis to guaranteeing the welfare of animals in the research facilities. The University provides funding for staff, infrastructure, and (continuous) education.

In Switzerland, the 3Rs principle is included in the animal protection legislation as a binding principle when conducting animal experiments. Animal experimentation in Switzerland is underpinned by three key pillars: authorisation, training, and inspection. Current legislation stipulates that every animal experiment and the keeping of laboratory animals must be authorised.

A weighing of interests is carried out for each application for an animal experiment. The expected gain in knowledge is weighed against the burden on the animals. The aim of the authorisation procedure is to keep the number of animals as low as possible, protect the animals from excessive stress, and define appropriate termination criteria. In addition, those conducting experiments are obliged to report the number of times they have used laboratory animals and officially detail completed experiments.

▷ www.fedlex.admin.ch/eli/cc/2008/416/de

▷ www.blv.admin.ch > Animals > Animal experimentation > Severity and harm-benefit analysis > Guidance (pdf)

3. Success stories

▶ Health

A newly discovered natural compound protects against macular degeneration

Age-related macular degeneration is the leading cause of blindness among seniors. Researchers from the University of Fribourg, part of a team led by Professor Patricia Boya, working with the Center for Biological Research Margarita Salas in Spain, have shown that the natural compound urolithin A can alleviate degeneration and preserve visual function.

▷ www.unifr.ch/news/en/31243

▶ Biomedicine

Refined methods for conducting cognitive tests on laboratory monkeys

Researchers at the Swiss Non-Human Primate Competence Center for Research at the University of Fribourg have developed a method that significantly improves the well-being of the macaques used in experiments. Instead of having an anchoring system implanted into the surface of the skull to stabilize and hold the head during a visual task, in future experiments the primates can place their head in a chin rest and take breaks independently as they please.

▷ www.unifr.ch/news/en/31126

▶ Biology

Research on muscle regeneration thanks to zebrafish

Human muscles can only regenerate minor injuries, such as those sustained during sports. After an accident or combat injury, however, large wounds often lead to muscle damage that cannot regenerate but instead forms a scar, which can restrict mobility. Some animals, however, have strategies for completely replacing damaged body parts. In a recent study, researchers at the University of Fribourg describe how zebrafish can regenerate several muscles after a deep injury to the base of their tail fin.

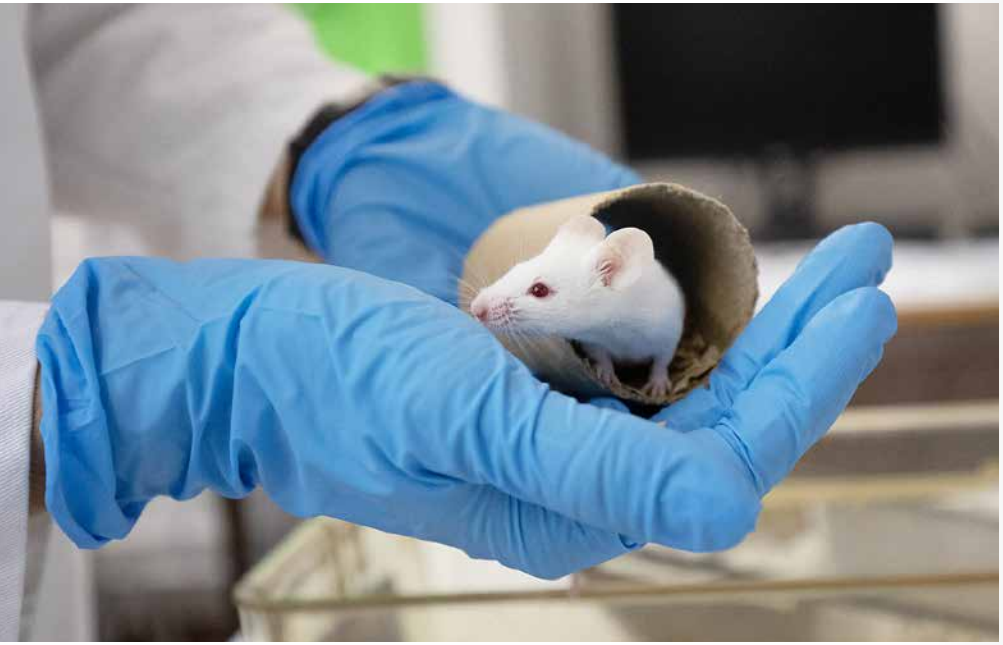
▷ www.unifr.ch/news/fr/30823

4. Species

Rodents and Rabbits

The **mouse** is the most common animal model in research and is used in a very wide range of studies. At the University of Fribourg, too, it is by far the most common type of animal employed in research projects, followed by rats in the rodent category. Finally, a very small quantity of rabbits are also used, and although they do not belong to the category of rodents, they should nevertheless be mentioned here, given they are utilised in the same research areas as mice and rats.

In Fribourg, these animal species are used in a great number of ways, to study the development of various cancers, to understand circadian rhythms, the immune system, Down's Syndrome, metabolic and cardiovascular diseases, and liver regeneration, to search for treatments for neurological disorders such as multiple sclerosis, and much more.



Primates

The University of Fribourg also houses a small colony of macaques with individuals from two different species as part of the Swiss Non-Human Primates Competence Center for Research (SPCCR).

▷ www.unifr.ch/spccr/en

The **cynomolgus macaque**, also known as the long-tailed macaque and the crab-eating macaque, is indigenous to tropical South and Southeast Asia.

The **rhesus monkey**, or *Macaca mulatta*, is native throughout mainland Asia, from Afghanistan to India, Thailand and South China.

Both species live in groups in forests or forested areas, but also close to human settlements. For their housing in human care, it is therefore particularly important that they live in stable social groups and have opportunities to climb and rest in elevated areas. As in nature, they spend most of their time searching for food; they are very prone to foraging, and providing food rewards can also be used in behavioural training.

In Fribourg, they are used in the neurosciences for research into possible treatments for disorders like stroke and spinal cord injury, and in developing visual and acoustic prostheses. Some of these projects have led to human clinical trials.

Other species

Tupaia, or the **tree shrew**, is a small mammal used in neuroscience research as an alternative to primates because, like the latter, it has complex neurological functions that make it possible to study human neurological diseases. At Fribourg, tree shrews are used to study neurological and visual processes.

Zebrafish are small fresh water fish native to South Asia and commonly found in home aquariums. At Unifr, zebrafish are studied for their ability to regenerate. In fact, as adults, this species can repair and regrow injured parts of its body, such as its fins or even the heart, an ability that mammals do not possess.

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