



Technical information on animal experimentation

The term line and the monitoring of constraint in targeted lines

1 The term line and targeted lines

The term line or animal line includes established inbred lines or breeding strains that have been bred for generations and generally have a clearly defined phenotype.

However, the term line also describes groups of animals which are crossed for a specific objective or are produced from such targeted crosses (targeted lines). Thereby the animals of the original lines have very different genotypes and the desired genotype is obtained only at the end of a series of crosses. Various unwanted genotypes are produced during the intermediate stages and, in most cases, only a few individuals with an identical genotype are obtained. All animals which do not have the necessary combination of genes are excluded from further breeding (so-called exclusion animals). Typical examples of such lines are conditional knock-outs (Cre/loxP).

Such targeted lines are not usually established because breeding is generally discontinued when, for example, a question has been conclusively answered and no further animals are required. Dispensing with further breeding is an aim to be pursued, especially in the case of lines showing an impaired phenotype. However, a line may be developed by continuing crosses and may therefore remain "under investigation".

2 Monitoring of constraint in targeted lines

The following points are important from an animal welfare perspective:

- Constraint or impairment should be identified and announced at an early stage (Art. 124 and Art. 126 TSchV, Art. 17 TVV).
- Measures to reduce constraint or impairment should be taken immediately (Art. 125 TSchV, Art. 12 para. 3 TVV).
- Breeding lines with high constraint or impairment should not only be assessed first by the committee in 100 animals (weighing of interests); breeding documents should also be made available at an early stage if required (Art. 127 TSchV, Art. 18 TVV).

Monitoring of constraint for targeted lines follows the same procedure (announcement by **Form-M**) as for all lines in which constraint is suspected (Art. 124 TSchV, Arts. 12-16 TVV). Since they are not usually established, specific questions arise in the monitoring of constraint and any announcements.

- From the outset, targeted lines require a **data sheet** for genetically modified lines or mutants with an impaired phenotype (Art. 23 TVV) which indicates the purpose of the line breeding. One **data sheet** per target is needed.

- The **data sheet** lists all animals used to achieve the breeding objective, including original animals, all offspring and animals later crossbred, even though they may have very different genotypes and often exist only for short breeding stages.
- The **data sheet** is added to on an ongoing basis and contains the matrix of all expected genotypes and the desired combinations. The **data sheet** also provides information on the number of animals used and produced, and on their fate (further breeding, animal experimentation, excluded from breeding).
- Even though the number of identical animals produced is not usually large enough for a conclusive monitoring of constraint, it must be carried out systematically from the outset in all animals. Only the step of summarising characterisation is omitted because it is hardly ever the case that enough individuals with the same genotype are produced.

3 Annex

3.1 Glossary

The terms most commonly used in science in English are not the same in some respects as those used in Swiss animal welfare legislation. For that reason, some terms are defined in this technical information sheet for the purposes of Swiss law.

Term	Signification
Inducible line	A line in which, in the genetically modified animals, the administration of a substance regulates the expression of a gene. Accordingly, constraint can depend on the manifestation or modification of the transgene. Inducible lines are not regarded as having an impaired phenotype as long as the animals do not show the impairment.
Line	A line generally deviates from the strain by one or more defined genetic changes introduced into the appropriate genetic background by genetic engineering methods, breeding or mutagenesis.
Strain	Animals with an identical genetic makeup which were generally produced and are maintained by inbreeding. This particular genetic makeup is also often referred to as “background” in the case of genetically modified and thus co-isogenic animals. There are a number of well-characterised strains such as C57BL/6 or BALB/c.
Targeted line	Group of animals which are produced by crossing different lines with different genotypes to reach a specific goal. The intended genotype may be created after one or at the end of a series of crossings. During the intermediate stages a variety of unwanted or temporarily needed genotypes will occur. Usually only a few animals with the same genotype will be created.
TSchG	Tierschutzgesetz (Animal Welfare Act) of 16 December 2005 (SR 455).
TSchV	Tierschutzverordnung (Animal Welfare Ordinance) of 23 April 2008 (SR 455.1).
TVV	Tierversuchsverordnung (Ordinance on laboratory animal husbandry, the production of genetically modified animals and the methods of animal experimentation; Animal Experimentation Ordinance) of 12 April 2010 (SR 455.163).

3.2 Legislation

English is not an official language of the Swiss Confederation. No official English translation of the law is available. The translation is provided on the FSVO website for information purposes only:
<https://www.blv.admin.ch/blv/en/home/tiere/tierversuche.html>.