Home Office

Additional statistics on breeding and genotyping of animals for scientific procedures, Great Britain 2017

Establishments licensed to use animals for scientific purposes reported that:

For the whole of 2017

- **1.81 million** non-genetically altered (non-GA) **animals** were bred for scientific procedures but **were killed or died without being used in regulated procedures**.
- The majority of these animals were **mice (80%)**, **rats (11%)** and **fish (7%)**.
- **In total, there were 5.53 million animals used in science in Great Britain**. This includes animals counted in the annual statistics that were involved in the creation or breeding of GA animals and animals used in experimental procedures.

For July to December 2017

- **Genotyping was reported on 705,000 animals**, the majority of which were **mice (95%)**, **fish (4%)**, and **rats (0.4%).**
- Of these animals, **77%** were genotyped using tissue samples that had already been taken for identification purposes and therefore the animal **did not experience any additional pain for the purpose of genotyping.**

Contents

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1. Introduction

The statistics in this release cover:

- the number of 'genetically normal' (i.e. non-genetically altered (non-GA)) animals that were bred for scientific procedures but were killed or died without being used in procedures; and,
- the number of animals (GA and non-GA) subject to tissue sampling for the purposes of genotyping[1].

These statistics are being published for the first time by the Home Office, using data from establishments in Great Britain that were licensed to use animals for scientific purposes in the calendar year 2017. These data were collected by the Home Office under the EU Directive (2010/63/EU) that requires Member States to collect additional data on breeding and genotyping of animals for scientific procedures every 5 years, from 2017.

The Home Office also publish annual statistics on the number of animals used in experimental procedures and the number of animals involved in the creation and breeding of GA animals that were not used in experimental procedures.

The new statistics can be combined with the numbers reported in the annual statistics to provide the total number of animals used in science covered by the Animals (Scientific Procedures) Act (ASPA) in Great Britain, in 2017.

In addition, there is supplementary information on the efforts made by establishments to refine tissue sampling techniques for genotyping, published as Refinements to genotyping techniques Great Britain, 2017.

The statistics in this release should be treated as experimental as they cannot be confirmed to meet the data quality standards of official statistics as set out in the Code of Practice for Statistics and should therefore be treated with caution. Please see section 4 for further information about the quality of the data collected.

[1] Data on genotyping covers the period 1 July to 31 December 2017, as reporting only began in July 2017.

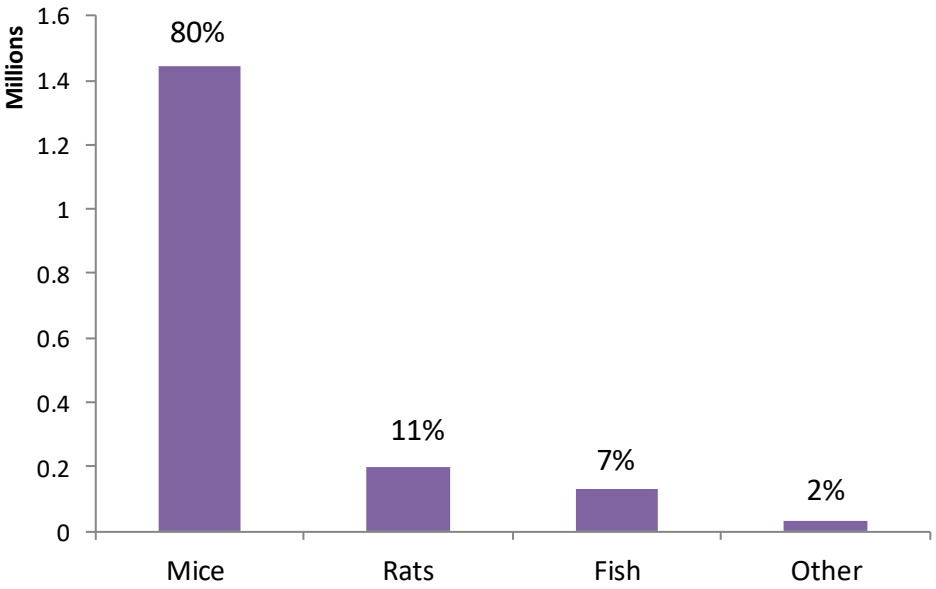
2. Animals that were bred for scientific procedures but were killed or died without being used in procedures

In 2017, there were **1.81 million non-GA animals that were bred for scientific procedures but were killed or died without being used in procedures**[2]. These animals were not used in scientific procedures for one or more of a number of reasons that may include:

- they were breeding animals (i.e. wild types) that underwent no procedures themselves;
- they were not subjected to regulated procedures but were used to provide tissue only;
- they were the wrong gender for a particular purpose; or,
- they were a necessary surplus resulting from the breeding of animals to ensure adequate supply for scientific purposes.

Of the 1.81 million animals, 80% were **mice**, 11% were **rats** and 7% were **fish**, as shown in Figure 1.

Figure 1: Animals that were bred for scientific procedures but were killed or died without being used in procedures, Great Britain, 2017



Source: Home Office, Additional statistics on breeding and genotyping of animals for scientific procedures, Table 1.1

[2] Within this group, there may be a small number of GA animals that do not appear in the annual statistics as their genotypes are stable and their phenotypes were not harmful above the threshold for regulation.

These proportions are in line with expectations, given that these animals form part of the supply chain for animals used in regulated experimental procedures as presented in the annual statistics, which show that mice, fish and rats are the most commonly used species.

Of the 1.81 million animals that were killed or died without being used in scientific procedures:

- **15**% were related to **the maintenance (12%) or creation (3%) of a new GA line**;

This includes animals that were wild type offspring of GA parents and those killed during non-regulated breeding procedures. In addition, this group could include wild type animals used for backcrossing, which is a technique used to re-invigorate a genetic line.

- **85**% were **not related to the creation or maintenance of a GA line.**

This includes animals that may have been surplus bred stock that were killed at a breeding establishment and not sold on to users; or, they may have been killed solely for tissue collection; or, they were bred specifically for use in procedures but died before being used.

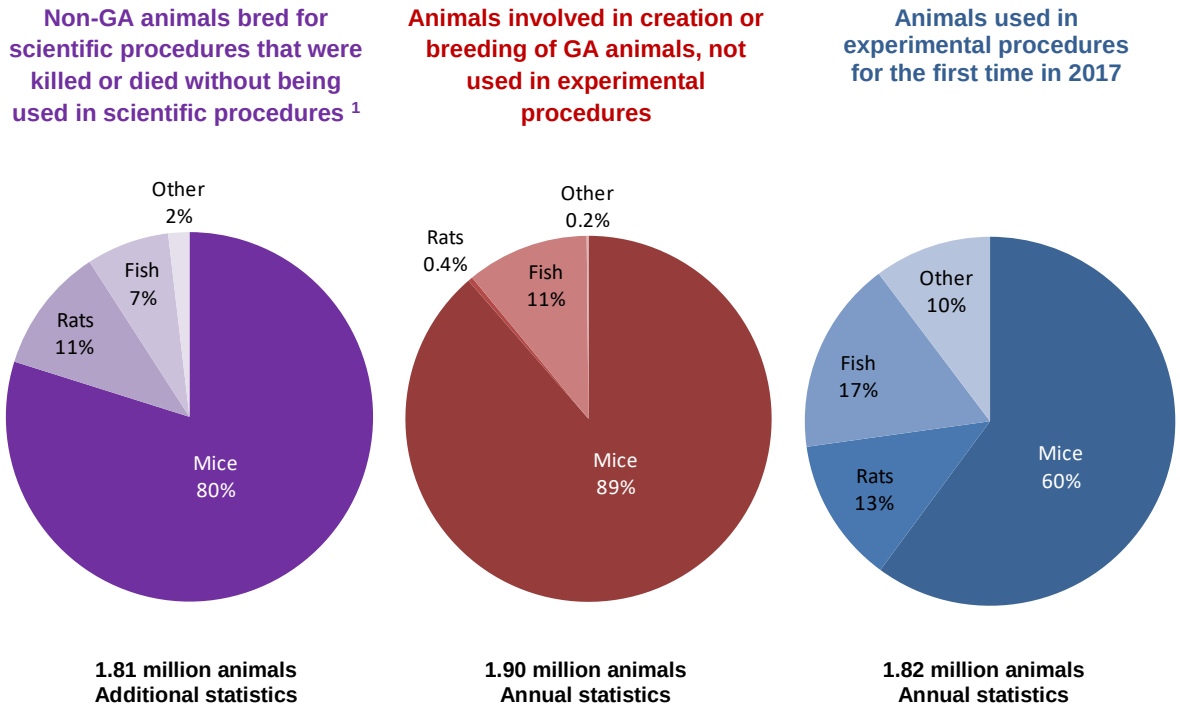
2.1 The total number of animals in science in Great Britain, 2017

Taking the 1.81 million non-GA animals together with the animals involved in the creation and breeding of GA animals and the animals used for the first time in experimental procedures published in the annual statistics, provides the total number of animals used in science covered by ASPA in Great Britain, in 2017.

In 2017, there was a total of **5.53 million protected animals used in science** in Great Britain[3]. Of these animals, two thirds (67%) were involved in the creation and breeding of animals and one third (33%) were used in experimental procedures.

[3] **Protected animals** are defined as any living vertebrate, other than man, and any living cephalopod. This includes embryos after two thirds of gestation (although these are not included as countable procedures), and fish and amphibian larvae after they become capable of free feeding.

Figure 2: Proportions of animals used in science in Great Britain, 2017



Source: Home Office, Additional statistics on breeding and genotyping of animals for scientific procedures, Table 1.2.
Home Office, Annual Statistics of Scientific Procedures on Living Animals Great Britain 2017, Table 1a.
1. Within the group of animals bred for scientific use that were killed or died without being used, there may be a small number of GA animals with stable genotypes that were involved in the breeding of animals but were returned here rather than in the Annual Statistics as the breeding procedures themselves did not cross the threshold for regulation.

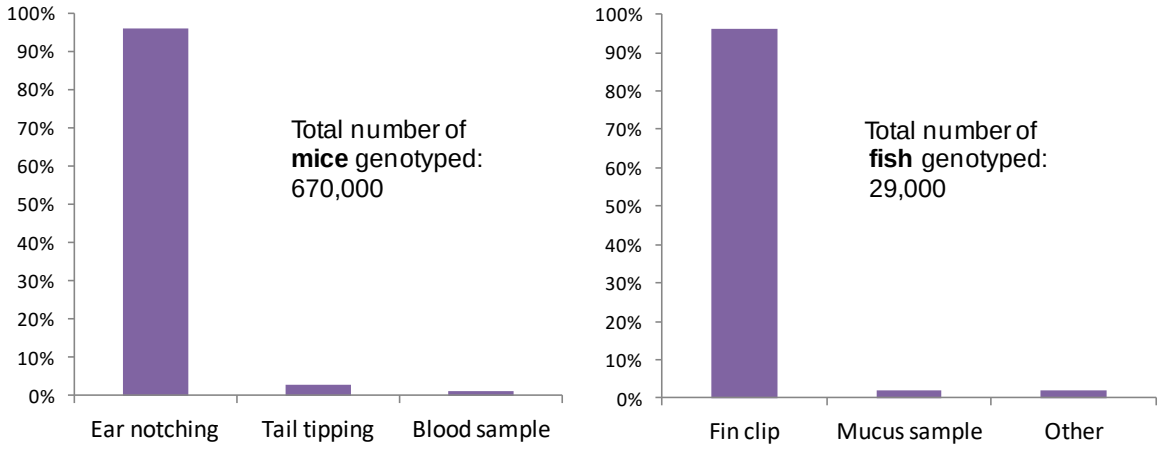
As shown in Figure 2, across the three groups **mice are the species most commonly used in science.**

3. Tissue sampling for genotyping

Genotyping is the process of investigating the genetic make-up of an animal and usually requires an analysis of DNA. This is undertaken using a small sample of tissue from an animal.

Between 1 July and 31 December 2017, licensed establishments reported on the genotyping of 705,000 animals. Of these animals, the majority were mice (95%), followed by fish (4%) and rats (0.4%). **All methods used were characterised as being of mild severity or less.**

Figure 3: Methods used to genotype mice and fish, 1 July to 31 December 2017



Source: Home Office, Additional statistics on breeding and genotyping of animals for scientific procedures, Table 2.1 and Table 2.2.
Please see the tables for a more detailed breakdown of the other methods of genotyping used.

For the genotyping of mice, the most commonly used methods were ear notching (96% or 646,000), **tail tipping** (3% or 17,000) and the collection of a **blood sample** (0.9% or 5,800).

Of the 646,000 mice genotyped using ear notching, 84% used tissue that had already been taken for the purpose of identification and, therefore, the mice did not experience additional pain for the purpose of genotyping.

In contrast, for the genotyping of fish, the principal method used was fin clipping (96% or 28,000). Fin clipping cannot be used for long-term identification of a fish, as the clipped fin can grow back. Therefore, unlike in mice, this method is not used as a method of identification where surplus material is used for genotyping, so a specific sample must be collected for genotyping. Fin clipping is undertaken under anaesthesia and is considered to be ‘mild’ in severity.

Table 1: Glossary of genotyping methods

Ear notching	A small section of the ear is removed using a specially designed tool.
Tail tipping	The end of a tail (usually 3mm or less) is removed using a scalpel under local anaesthesia.
Blood sample	For mice, this usually involves pricking the end of the tail with a needle to collect a blood sample.
Fin clipping	A small section of a fin is removed whilst the animal is anaesthetised.
Mucus sample	A swab is used to remove mucus by lightly brushing the side of the animal.
Toe removal	The end part of a single toe is removed under anaesthesia. This is conducted on very young animals before the ear is large enough to be notched.
Saliva	A small cotton wool swab is swept around the inside surfaces of the mouth.
Hair/fur	A few hairs or fur are either brushed or plucked from the animal.
Other	Examples include fluorescence genotyping, where animals containing the genetic alteration of interest fluoresce under ultra-violet light.

Some establishments reported that they are trialling the collection and testing of mucus samples as a method of genotyping fish (2% of fish; 530); however, it has not yet been determined to be as accurate as fin clipping for genotyping.

For the majority (77% or 544,000) of the reported genotyping, the animals were **genotyped using surplus tissue samples** that had already been taken for the purpose of identification. In these cases, the severity was not recorded as the animals did not experience additional pain for the purpose of genotyping. Mice and rats were the only animal species genotyped using surplus material from identification.

For the remaining cases (23% or 161,000) where tissue samples were taken from animals specifically for genotyping, the majority (87%) of the procedures were **assessed as being mild in severity** and, almost all the remainder were sub-threshold (14%).

Of the 82% (581,000) of genotyped animals for which establishments recorded whether the animals were subject to repeated genotyping, only 0.8% (180) of fish and 3% (15,000) of mice had **multiple tissue samples taken**. Multiple samples are usually taken if the first sample does not provide a clear and accurate test result. This may occur because of contamination of the original sample, its degradation during transport or failure of the laboratory testing process.

Establishments provided further details about the efforts to refine techniques of genotyping, including using less severe techniques and the results achieved so far. This information is published as Refinements to genotyping techniques Great Britain, 2017.

4. Data coverage and data quality

Statistics on the number of non-GA animals bred for scientific procedures that were killed or died without being used, presented in tables 1.1 and 1.2, cover the full calendar year of 2017.

Statistics on genotyping, presented in tables 2.1 and 2.2, cover the second half of 2017 i.e. 1 July to 31 December.

4.1 Data source

For these data, returns were provided for all establishments licensed to use animals for scientific purposes in 2017.

4.2 Coverage

The statistics in this release cover establishments in Great Britain only. The Northern Ireland Department of Health separately collects this information under devolved arrangements.

4.3 Rounding

Rounding was employed in the narrative to the statistical release to simplify the presentation of figures. The rounding conventions are as follows:

Figure	Rounding convention
Over 1 million	Presented as millions and rounded to two decimal places e.g. 2,121,582 = 2.12 million
10,000 to 999,999	Rounded to the nearest thousand e.g. 343,465 = 343,000
1,000 to 9,999	Rounded to the nearest hundred e.g. 8,465 = 8,500
10 to 999	Rounded to the nearest ten e.g. 47 = 50
Percentages greater than 1%	Rounded to the nearest percent e.g. 1.43% = 1%
Percentages less than 1%	Rounded to the nearest significant figure e.g. 0.43% = 0.4%, and 0.043% = 0.04%

The data in the data tables of the statistical report are all unrounded. This is to promote transparency and to allow users to extract the data for their own calculations.

Experimental statistics and data quality

These new statistics are considered to have immediate value to users and help with the understanding of animals used in science in Great Britain. However, given the current quality limitations, these statistics are published as 'Experimental Statistics'. Experimental Statistics are statistics which are published in order to involve users and stakeholders in their development and as a means to build in quality at an early stage.

The quality limitations of these statistics, and other issues which users should be aware of, include:

1. This is the first time that this data has been collected, therefore there was no previous data available to use for comparison and quality assurance purposes.

2. The data provided has relied upon the correct interpretation of the instructions. It has not been fully validated by the Home Office Animals in Science Regulation Unit (ASRU), which is responsible for regulating the operation of the Animals (Scientific Procedures) Act 1986 (ASPA).

3. The data concerning the genotyping of animals in tables 2.1 and 2.2 cover a 6-month period only (1 July to 31 December 2017).

4. The data concerning the genotyping of animals contains a small proportion (18%) of "do not know if previously re-sampled for genotyping" entries, therefore the data we have on repeated genotyping is not representative of all establishments' genotyping animals in 2017.

5. Further information

5.1 Related statistical releases

This release covers England, Scotland and Wales. For Northern Ireland, the Department of Health has separately collected and published this information here.

As mentioned in this release, the Home Office also produces annual statistics on 'Scientific procedures on living animals, Great Britain'. The most recent publication can be found here.

5.2 Feedback and enquiries

The responsible statistician for this publication is Amy Baxter.

We welcome feedback on this statistical release. If you have any feedback or enquiries about this publication, please email the Fire, Licensing and Public Order Analysis Unit at FLPOAU@homeoffice.gov.uk.

The 'Additional statistics on breeding and genotyping for scientific procedures' release has been produced by statisticians working in the Home Office Analysis and Insight Directorate in accordance with the Home Office's 'Statement of compliance with the Code of Practice for Official Statistics' which covers our policy on revisions and other matters. The Chief Statistician, as Head of Profession, reports to the National Statistician with respect to all professional statistical matters and oversees all Home Office Statistics products with respect to the Code, being responsible for their timing, content and methodology.

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