Home Office

Annual Statistics of Scientific Procedures on Living Animals Great Britain 2017

HC 1369

Annual Statistics of Scientific Procedures on Living Animals Great Britain 2017

Presented to Parliament pursuant to section 21(7) and 21A(1) of the Animals (Scientific Procedures) Act 1986

Ordered by the House of Commons to be printed 19 July 2018

HC 1369

This publication is available at https://www.gov.uk/government/statistics/statistics-of-scientific-procedures-on-living-animals-great-britain-2017

Any enquiries regarding this publication should be sent to us at FLPOAU@homeoffice.gsi.gov.uk

ISBN 978-1-5286-0226-6

CCS0218041702 07/18

Printed on paper containing 75% recycled fibre content minimum

Printed in the UK by the APS Group on behalf of the Controller of Her Majesty's Stationery Office

Annual Statistics of Scientific Procedures on Living Animals Great Britain 2017

Contents

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007, signifying compliance with the Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

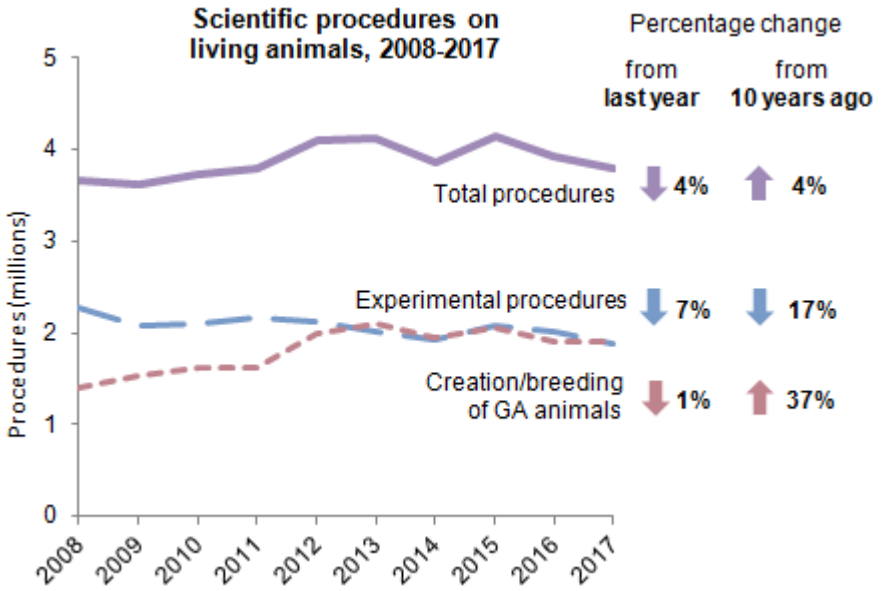
- meet identified user needs
- are well explained and readily accessible
- are produced according to sound methods
- are managed impartially and objectively in the public interest

Once statistics are designated as National Statistics, it is a statutory requirement that the Code of Practice shall continue to be observed.

This National Statistics output has been produced to the highest professional standards and free from political interference. It has been produced by statisticians working in the Home Office Science 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 National Statistics products with respect to the Code, being responsible for their timing, content and methodology.

Summary statistics

- In 2017, **3.79 million procedures** were carried out in Great Britain involving living animals.
- This is a decrease of 4% on last year, and the lowest number of procedures since 2010.
- Half were experimental procedures, whilst the other half were for the creation/ breeding of genetically altered (GA) animals.



- The number of procedures has risen 4% over the past ten years. This stems from a rise in the creation/ breeding and use of GA animals, largely due to the availability of new technology which has led to new research opportunities.

Experimental procedures

1.89 million procedures carried out for experimental purposes

These procedures involve using animals in scientific studies for purposes such as: basic research and the development of treatments, safety testing of pharmaceuticals and other chemicals, specific surgical training and education, environmental research and species protection.

Creation and breeding of GA animals

1.90 million procedures counted under the creation/breeding of GA animals

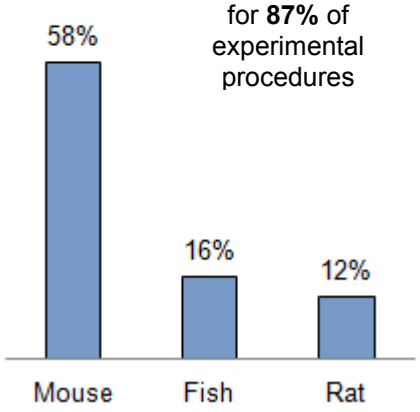
This refers to the breeding of animals whose genes have mutated or have been modified.

These animals are used to produce GA offspring for use in experimental procedures, but are not themselves used in experimental procedures.

Animal species

Top three species:

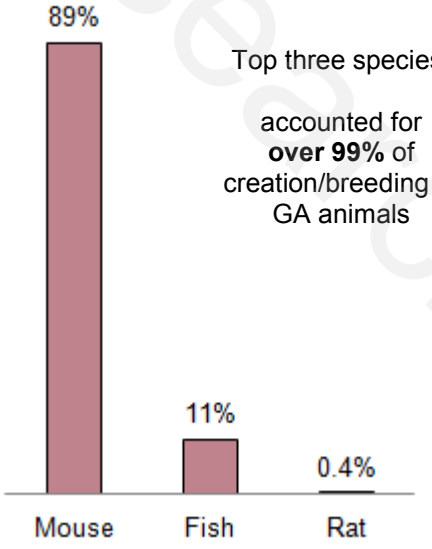
accounted for **87%** of experimental procedures



Specially protected species (cats, dogs, horses, primates) were used in 1% of procedures

Top three species:

accounted for **over 99%** of creation/breeding of GA animals

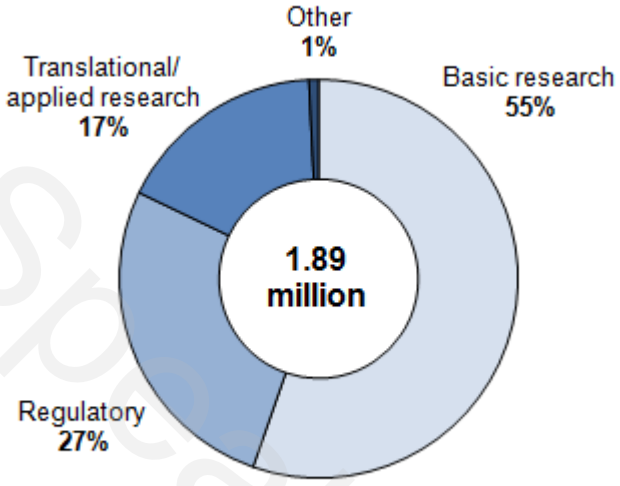


No specially protected species (cats, dogs, horses, primates) were used

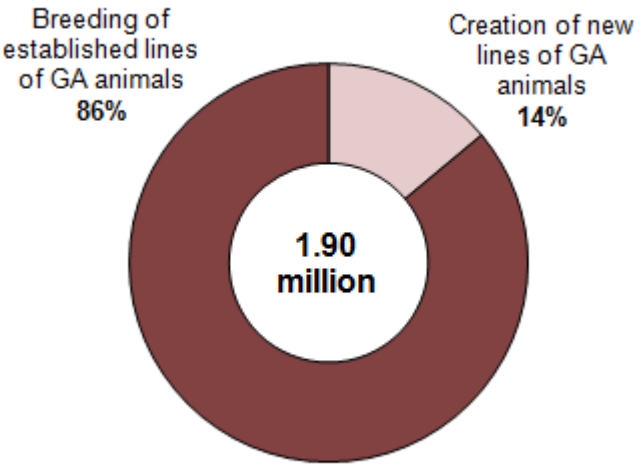
Experimental procedures

Creation and breeding of GA animals

Purpose of procedures



The majority of experimental procedures were undertaken for basic research – i.e. the study of biological functions and diseases.



The majority of animals in this category are from established colonies of GA animals, and include breeding stock and surplus offspring not used in experimental procedures.

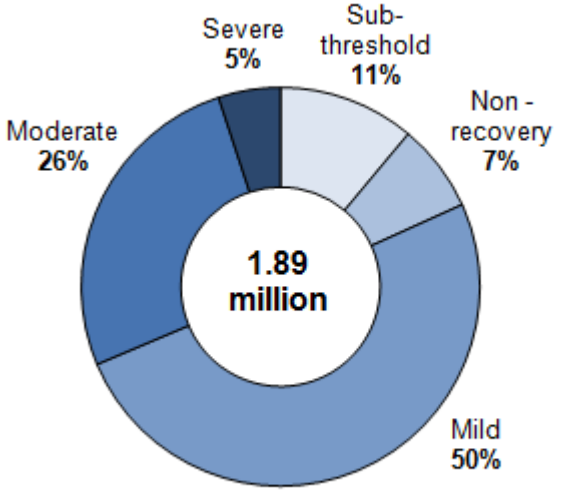
Genetic status

7%	Genetically altered – potentially harmful effects	**0.13 m**
31%	Genetically altered – no harmful effects	**0.59 m**
62%	Not genetically altered	**1.17 m**

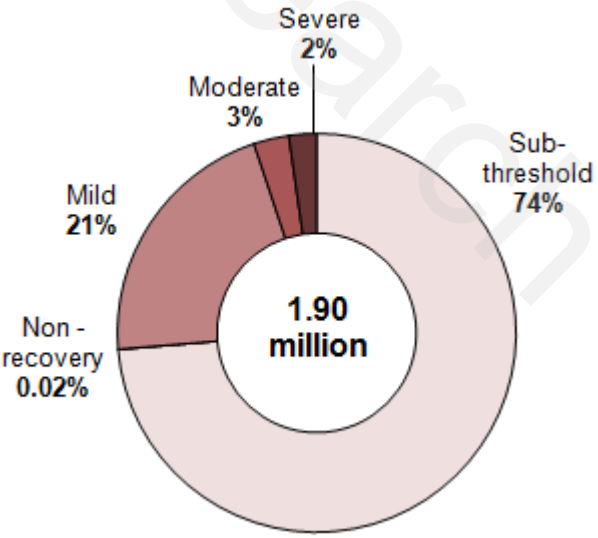
15%	Genetically altered – potentially harmful effects	**0.28 m**
80%	Genetically altered – no harmful effects	**1.53 m**
5%	Not genetically altered	**0.09 m**

Severity experienced by animals

Severity:
the maximum level of suffering experienced by an animal during an experimental procedure



Severity:
the maximum level of suffering experienced by an animal during its involvement in the creation or breeding of GA animals



Introduction

This report contains statistics on the **regulated scientific procedures** carried out on **protected living animals** in Great Britain each year.

Purpose of this release

The **Animals (Scientific Procedures) Act 1986**[1] regulates the use of animals in scientific procedures in the United Kingdom.

The 1986 Act requires licensing and oversight of all places, projects and personnel seeking to conduct scientific procedures on living animals.

This publication meets the requirements of the 1986 Act to publish, and lay before Parliament, annual statistics on the use of protected animals in regulated procedures[2].

Coverage of this release

These statistics cover England, Scotland and Wales.

For Northern Ireland, the Department of Health separately collects and publishes information on regulated procedures under devolved arrangements.

Definitions

Protected animals

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.

Regulated procedures

Any procedure applied to a protected animal for an experimental or other scientific purpose, or for an educational purpose, that may have the effect of causing an animal pain, suffering, distress or lasting harm equivalent to, or higher than, that caused by the introduction of a needle in accordance with good veterinary practice. These procedures are referred to in the release as **experimental procedures**.

In addition, the breeding of an animal is a regulated procedure if the animal is bred from, or is the descendant of, an animal whose genes have mutated or have been modified and if this modification may have the potential to cause harm. These procedures are referred to in the release as **creation/breeding procedures**.

[1] Section 1 of the Animals (Scientific Procedures) Act 1986 (as amended) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/308593/ConsolidatedASPA1Jan2013.pdf. Further details of the general system of control under the 1986 Act can be found in the user guide.
[2] Section 2 of the 1986 Act.

Important information

The following information is important for understanding the statistics in this report. For further detail, please see the accompanying user guide.

'Number of procedures' is not 'number of animals'

The number of procedures carried out in a year does not always correspond with the number of animals that have been used in procedures that year. This is because some animals may be 're-used'. These instances are counted as separate, additional, procedures. As a result, the number of procedures is usually slightly higher than the number of animals used.

The statistics in this release and the accompanying data tables relate to the number of procedures, not the number of animals used, unless specified (i.e. tables 1a, 2.1, 2.2 and 2.3).

Changes in legislation and definitions

Prior to 1986, figures were recorded for the number of 'experiments' on living animals, under the Cruelty to Animals Act 1876. In 1986, the Animals (Scientific Procedures) Act was introduced, and required all 'scientific procedures' to be recorded. This new, broader term largely explains the increase in figures directly after 1986 (see Figure 1).

At the end of 2013, an EU Directive (2010/63/EU) came into effect and, as a result changed the way in which the data was collected under UK law from 2014 onwards. All figures for procedures (1986 onwards) are comparable as the definition of a procedure is unchanged. As a result of the change in methodology, the 2014 data is subject to data quality issues (see user guide for further information) and should be treated with caution.

Changes to data collection following EU Directive (2010/63/EU)

There were two key changes to the data collection, which affect the data from 2014 onwards:

1. Previously, procedures were reported in the year they began. From 2014 onwards, procedures are only counted if they have been completed in the reporting period. This change meant that procedures which began prior to 2014 but finished during or after 2014 should have been counted twice (once in the year they started, and again in the year they finished). However, a survey of data suppliers revealed that it is likely not all procedures that ended in 2014 were reported for a second time, resulting in under-reporting for 2014.
2. As a result of counting procedures once they are complete, since 2014 we have been able to collect data on the actual severity (a measure of pain, distress and suffering) each animal experienced during an entire procedure. Clear trends for this data will take a few years to emerge.

Other minor changes in how the data is now collected (e.g. purpose groupings) means it is not always possible to draw direct comparison between categories in the current data and data from before 2014.

Commentary

Total procedures

In 2017, there were 3.79 million procedures completed on living animals in Great Britain. This is a decrease of 4% from last year, and the lowest number of procedures since 2010.

Figure 1. Total scientific procedures in Great Britain, 1986-2017

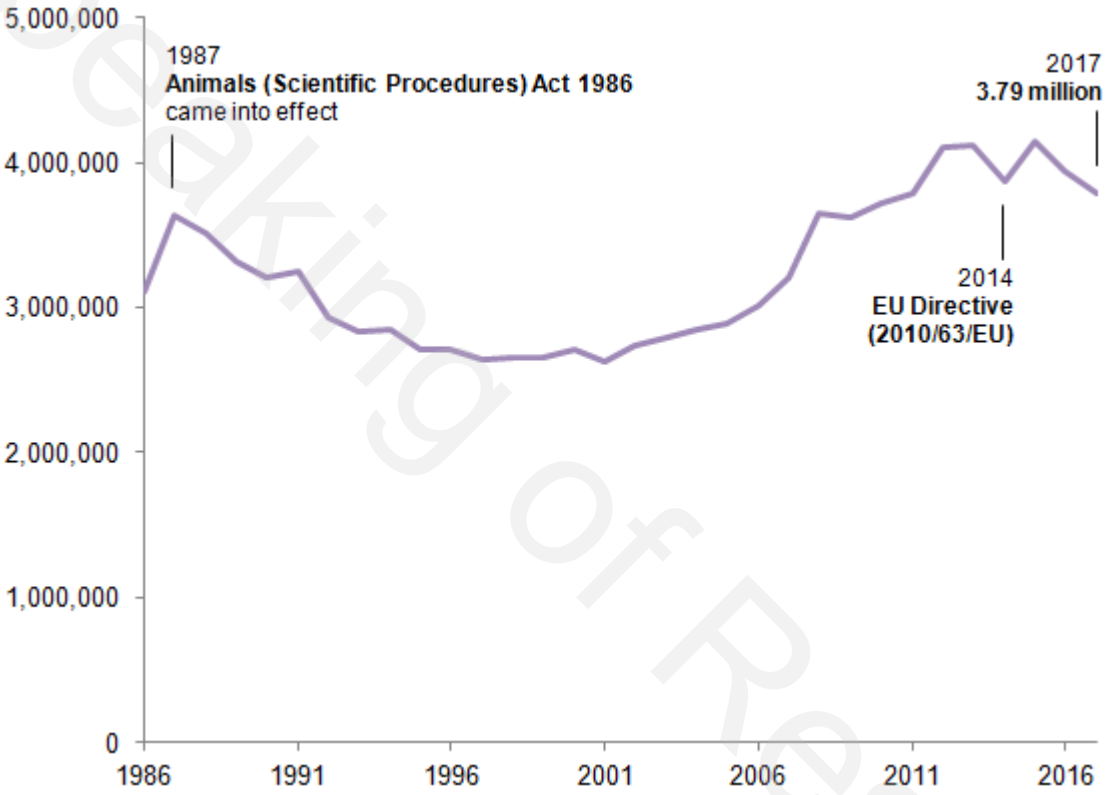


Figure 1 shows the trends in regulated procedures since 1986. The number of procedures carried out decreased from the late 1980's until 2001 to a low of 2.62 million. This was mainly due to a reduction in the use of rodents, rabbits and birds (although there was an increase in procedures involving fish).

After 2001, procedures rose, reaching a peak of 4.14 million in 2015, but has since lowered to 3.79 million in 2017. Although procedures have remained around 4 million for the last few years, any clear trend for recent years is as yet difficult to determine, as there is some year-on-year fluctuation. This recent fluctuation may partly be due to the change in recording in 2014 but also the innate variation in the number and type of scientific research projects conducted each year.

The number of procedures carried out on animals is determined by a number of factors, including the focus of scientific and medical endeavours, the economic climate and global trends in new technologies or fields of research.

While many types of research have declined or even ended in recent years, the development of modern scientific techniques has opened up new research areas. Such developments may have an effect not only on the number of procedures but also the purpose or type of procedure and on the animals used – e.g. the recent increase in the use of specific strains of GA animals (mainly mice).

Figure 2. Total scientific procedures by type, 2008-2017

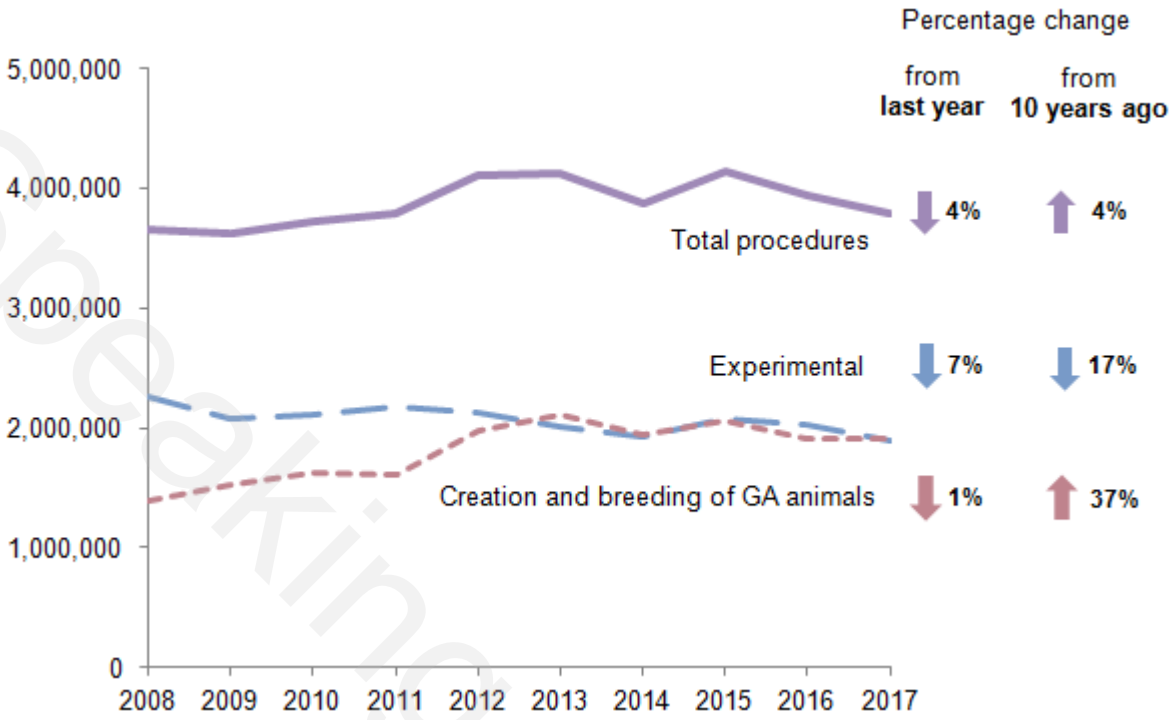


Figure 2 shows regulated procedures, split into experimental and creation/breeding of genetically altered (GA) animals (see sidebar for definition).

As shown in Figure 2, the 4% rise in the total number of procedures over the last decade has been driven by increasing numbers of procedures counted under the creation/breeding of GA animals, which has risen by 37% over the same period, from 1.39 million to 1.90 million. The increase can be explained largely by the availability of new technology, which has led to new research opportunities, especially in cancer and immunology, but increasingly in all areas of basic and applied research.

In comparison, over the last decade, the number of experimental procedures has fluctuated around 2 million, although 2017 showed a 7% decrease compared with the previous year.

Regulated procedures can be split into two types:

Experimental procedures involve using animals in scientific studies for purposes such as: basic biological research, medical studies and treatments, training and education, environmental research, species protection, and safety testing of pharmaceuticals and other chemicals. The animals used in experimental procedures may be genetically altered.

Procedures counted under the creation/breeding of GA animals involve the breeding of animals whose genes have mutated or been modified. These animals are not used in experimental procedures.

The following sections in this release look at experimental procedures and procedures counted under the creation/breeding of GA animals separately.

See the **data tables** and **time series tables** for further detail on regulated procedures from 2008 to 2017.

Experimental procedures

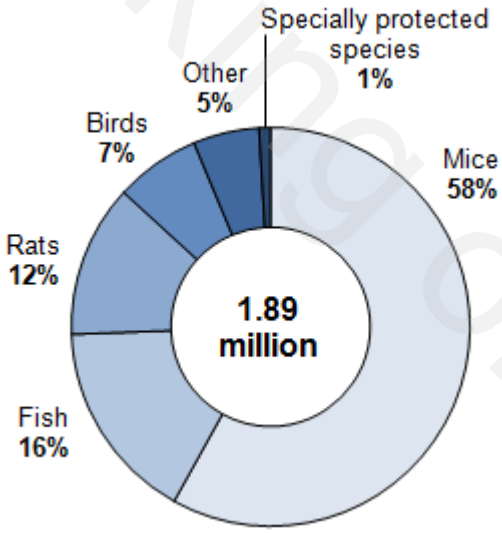
This section covers only experimental procedures. That is, procedures that involve using animals in scientific studies for purposes such as: basic biological research, medical studies and development of treatments, training and education, environmental research, preservation of species, and safety testing of pharmaceuticals and other chemicals. The animals used in experimental procedures may be GA.

This section excludes procedures counted under the creation/breeding of GA animals.

Species

Figure 3 shows the species used in the 1.89 million experimental procedures in 2017.

Figure 3. Experimental procedures by species, 2017



The proportions of species used for experimental procedures as shown above have remained mostly stable for the past decade. In line with the fall in overall procedures from 2016, most species in 2017 show a decrease in numbers. Most notably, the number of experimental procedures involving mice have decreased by 10% from 1.22 million (60% total of all procedures) in 2016 to 1.09 million (58%) this year. A notable exception to this overall decline is experimental procedures involving fish, which have increased by 8% from 287,000 (14% of total procedures) in 2016 to 308,000 (16%) this year.

For most species, small year on year variations can be attributed to technological developments and changes in the types and stages of projects being carried out in any reporting year.

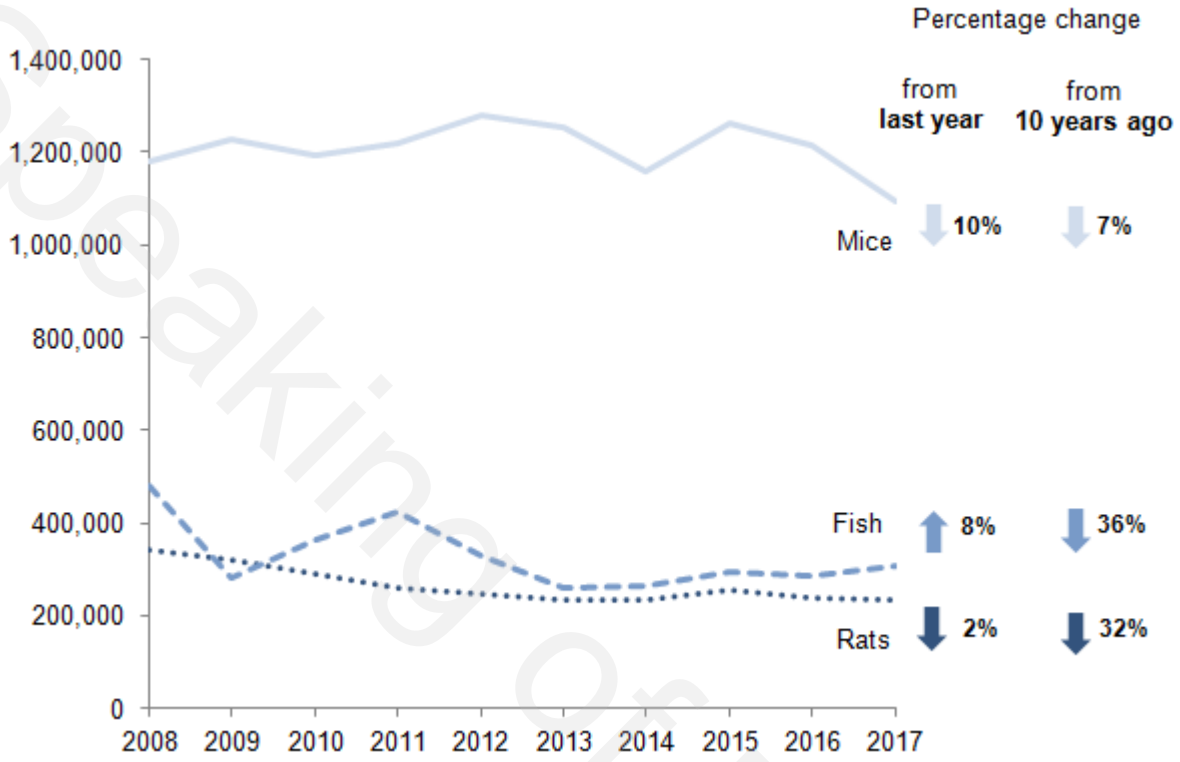
Mice, fish and rats in experimental procedures

The majority of experimental procedures used mice, fish and rats. Together these three species accounted for 87% of experimental procedures in 2017.

Most experimental procedures involving mice and fish (85% and 93%, respectively) were for basic and translational/applied research (e.g. studies that investigated the practical

application of biological processes, and the diagnosis and treatment of diseases). The majority of experimental procedures involving rats (62%) were for regulatory testing (e.g. tests evaluating the safety and efficacy of substances such as pharmaceuticals).

Figure 4. Experimental procedures involving mice, fish and rats, 2008-2017



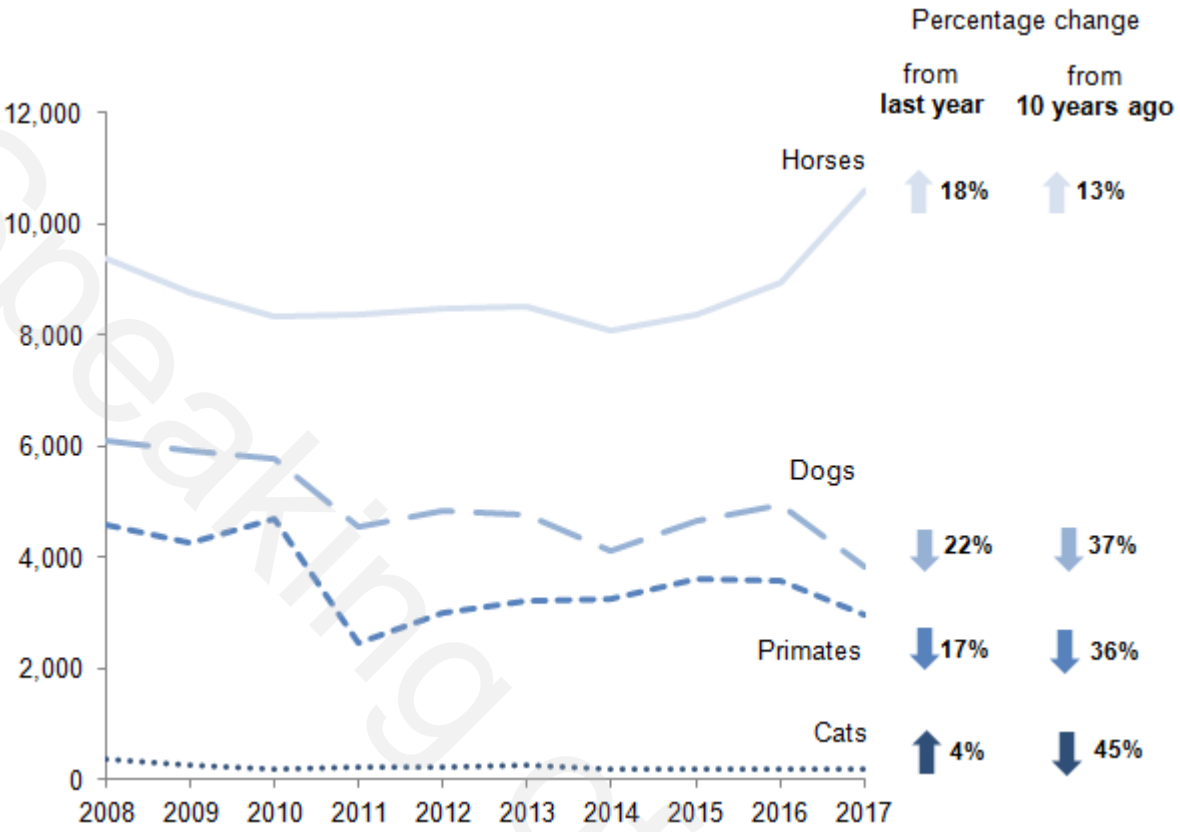
Mice, fish and rats have remained the most commonly used species over the last decade. The number of procedures involving mice and rats has shown a decrease from last year and from 10 years ago. Procedures involving fish have also decreased from 10 years ago, although the number of procedures in 2017 was an 8% increase from the previous year, mainly due to an increase in the use of transgenic zebra fish in basic research.

Specially protected species in experimental procedures

'Specially protected species' refers to cats, dogs, horses and primates. These species accounted for 1% of procedures in 2017.

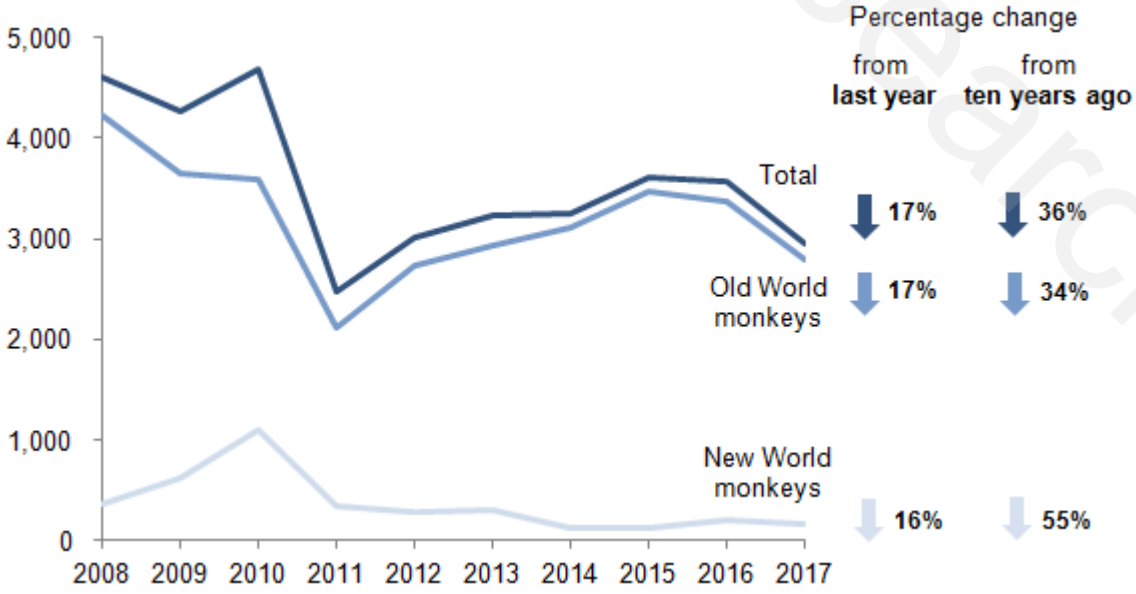
Cats, dogs, horses and primates are subject to additional protection under Section 5C of the 1986 Act. Licence holders using specially protected species must demonstrate that no other species are suitable for the purposes of the licence and must adhere to additional licence conditions.

Figure 5. Experimental procedures involving specially protected species, 2008-2017



The number of procedures involving specially protected species has decreased from 20,000 in 2008 to 18,000 in 2017. This fall includes a 37% decrease (2,300) in procedures involving dogs, and a 36% decrease (1,600) in procedures involving primates (see Figure 5). In contrast, procedures involving horses have remained roughly stable over the last decade but show an 18% (1,700) increase from 2016, principally for the provision of blood products for diagnostic products.

Figure 6. Experimental procedures involving primates, 2008-2017



The data collected on primates can be divided into two species categories: Old World monkeys and New World monkeys. Throughout the period, New World monkeys used in procedures were marmosets and tamarins, and Old World monkeys used were cynomologus macaques and rhesus macaques.

Old World monkeys are considered more relevant models for some human conditions than New World monkeys, and are predominately used for the testing of pharmaceuticals.

Old World monkeys account for 94% of primates used in experimental procedures. In 2017, the number of monkeys used fell by 17% from the previous year. Figure 6 shows there has been an overall reduction in the use of primates in the last decade, mostly driven by a 34% decrease (1,400) in procedures involving Old World monkeys.

Species not used in procedures

In 2017, no procedures were carried out on:

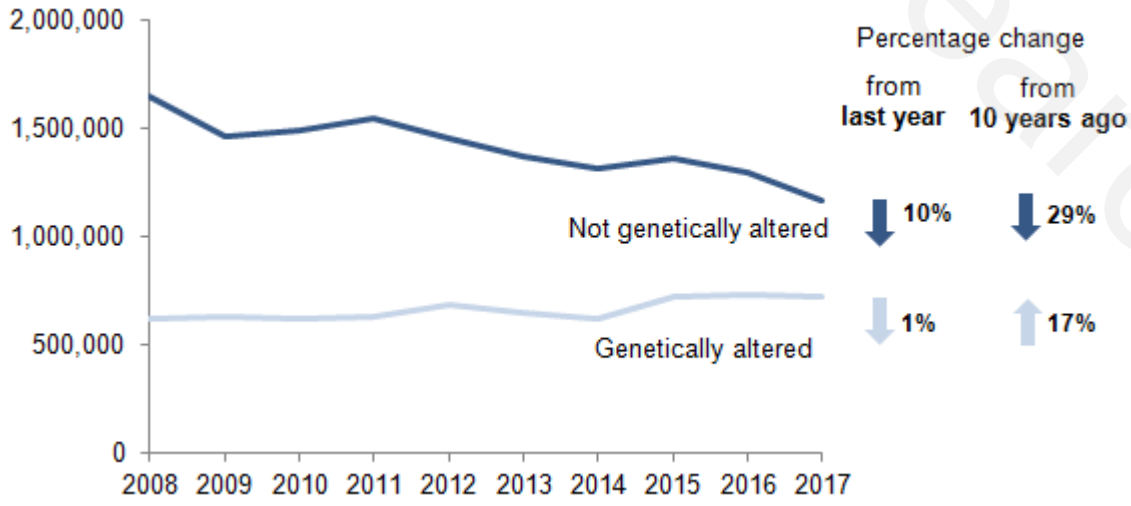
- various primate species (the use of great apes has not been permitted since 2013, although great apes have not been used since the 1986 Act was implemented)
- Chinese hamsters (*Cricetulus griseus*)
- cephalopods

Species have been presented in species groupings here but further breakdowns are available in the **data tables**. For the first time, further information has been included on other (non-Schedule 2) species – see the 'Further statistics' section later in the report, and table 12 (online only).
Tables 2.1, 2.2 and 2.3 provide further information on place of birth for all species and generation for primates.

Genetic status

Of the 1.89 million experimental procedures in 2017, the majority (62%) used animals that were not GA.

Figure 7. Experimental procedures by genetic status, 2008-2017



The number of experimental procedures involving non-GA animals fell by 10% from 2016 and by 29% over the last decade. In contrast, the use of GA animals in experimental procedures has increased over the last decade by 17% (see Figure 7). The rise in GA animal use is due to the new opportunities that have arisen from using genetic modifications.

Since 2014, GA animals are reported with further details of their genetic alteration: whether or not they have a harmful phenotype (i.e. a harmful physical or biochemical defect).

The 38% of experimental procedures that involved GA animals in 2017 can therefore be separated further:

- 31% involved animals that did not have a harmful phenotype (i.e. the animals did not appear or behave any differently from wild type animals);
- 7% involved animals that had a harmful, or potentially harmful, phenotype (i.e. the animal could experience negative effects as a result of the genetic alteration).

Genetic alterations – harmful phenotypes

Many lines of genetically altered animals do not exhibit any harmful phenotype and are visually and behaviourally indistinguishable from wild type animals.

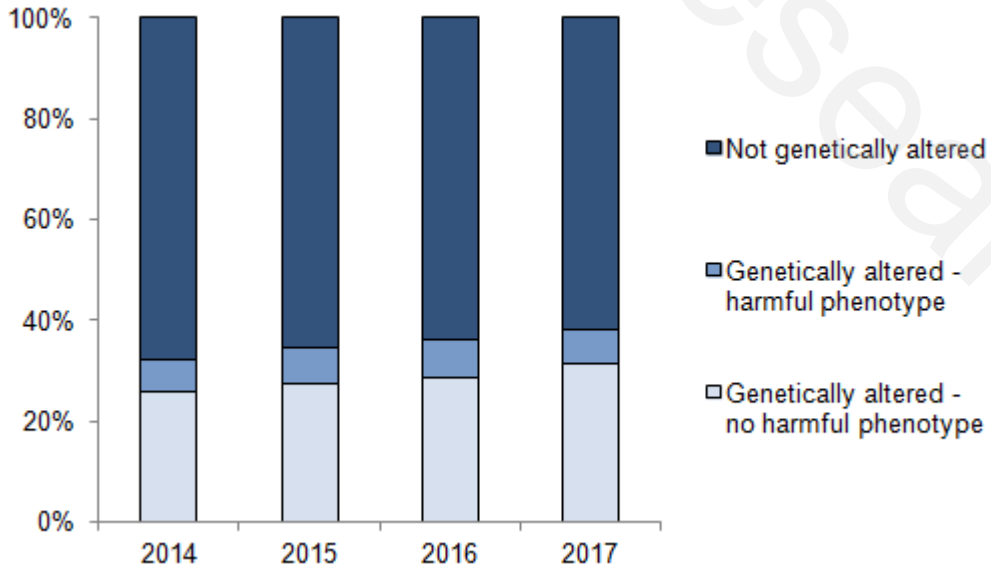
Some show a potentially harmful phenotype from birth, e.g. immune deficient mice. Others are overtly normal at birth but exhibit a harmful phenotype as they age, such as developing tumours.

Animals are reported as being without a harmful phenotype if they are used or killed before the development of a harmful effect.

The change towards using more GA animals can be seen in Figure 8. Although the number of both types of GA animals (harmful and non-harmful phenotypes) has increased, the overall rise in the use of GA animals is driven mostly by GA animals without a harmful phenotype.

See **data table** 4 for a breakdown of species by genetic status in 2017.

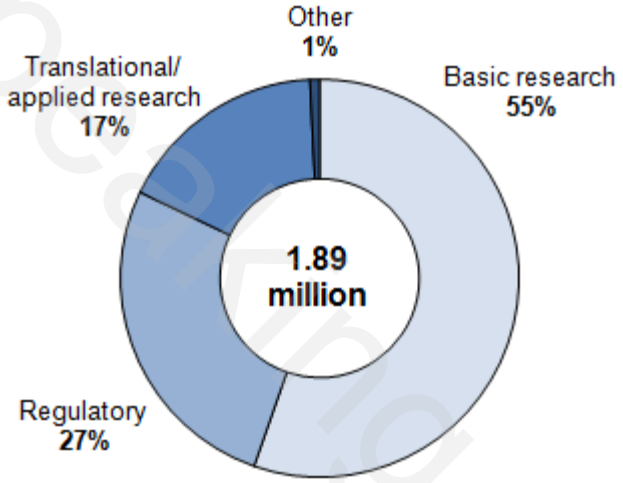
Figure 8. Experimental procedures by type of genetic alteration, 2014-2017



Purpose

Experimental procedures accounted for half (50%) of the 3.79 million procedures in 2017. They were carried out for a variety of purposes:

Figure 9. Experimental procedures by purpose, 2017



Over half (55%) of experimental procedures in 2017 were carried out for basic research. A further 27% were conducted for regulatory testing purposes, and the remainder were mostly for translational/applied research (17%). Only 1% of experimental procedures were carried out for other reasons, including: the protection of the natural environment, the preservation of species, higher education or training. No procedures were carried out for forensic enquiries in 2017 (or 2015 and 2016).

The proportions shown in Figure 9 have remained stable since 2014, when the data was first collected in these purpose classifications. The experimental purpose classifications from prior to 2014 are not directly comparable.

Basic research

In 2017, 55% of all experimental procedures were carried out for basic research purposes (1.04 million procedures). The most common areas targeted in this research were: the nervous system (23%), the immune system (20%), and oncology (12%); see Figure 10 for more detail.

Experimental procedure purposes

Basic research: to add to our knowledge of the normal and abnormal structure, functioning and behaviour of living organisms and the environment.

Translational/applied research: to address human or animal health and disease, from assessment and diagnosis to prevention and development of drugs and treatments, but excluding studies carried out for regulatory purposes.

Regulatory testing: to satisfy legal requirements, including: ensuring substances – such as materials for diagnostic tests (e.g. blood products) – are produced to legal specification; evaluating the safety or effectiveness of pharmaceuticals; and evaluating the safety of other chemicals.

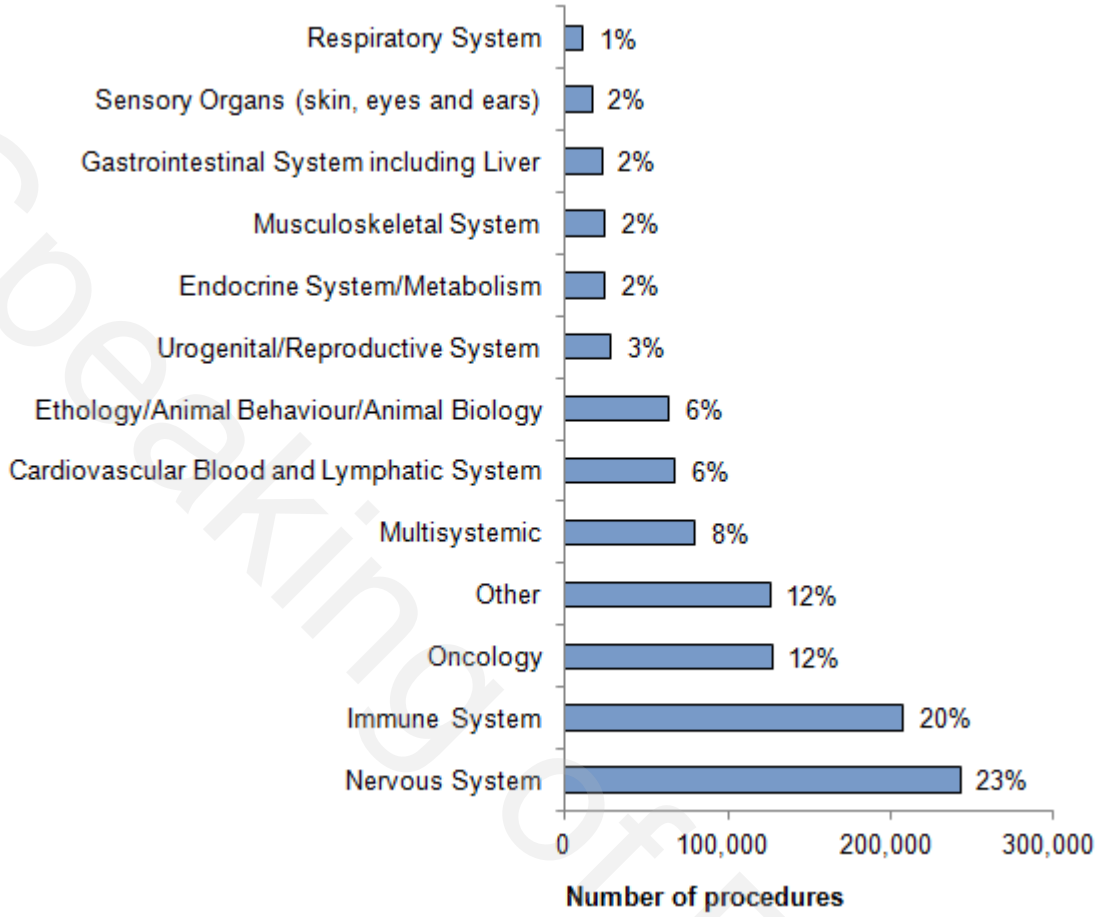
Protection of the natural environment: in the interests of the health or welfare of man or animals.

Preservation of species: aimed at preserving the species of animal subjected to regulated procedures as part of the programme of work.

Higher education or training: procedures for the acquisition, maintenance or improvement of vocational skills.

Forensic enquiries: tests as part of forensic investigations and the production of materials, e.g. antisera (blood serum products for the detection of specific diseases), for use in forensic investigations.

Figure 10. Experimental procedures for basic research by sub-purpose, 2017



The 12% of basic research categorised as 'Other' includes the collection of tissues for research from ex-breeding animals and regulated procedures for research into embryology and developmental biology, cell biology, genetics and parasitology (including the production of parasites).

The distribution of sub-purposes shown in Figure 10 has remained similar since 2014. Studies into the functioning and disease of the nervous system, the immune system, cancer (including its development and control mechanisms (oncology)) and multisystemic research, wherein numerous body organs and systems and not one in particular is the target, have been reported within the top 5 most common areas for basic research in each year.

See **data tables** 3.1, 3.2 (online only) and 5 for a breakdown of basic research by species and severity for 2017.

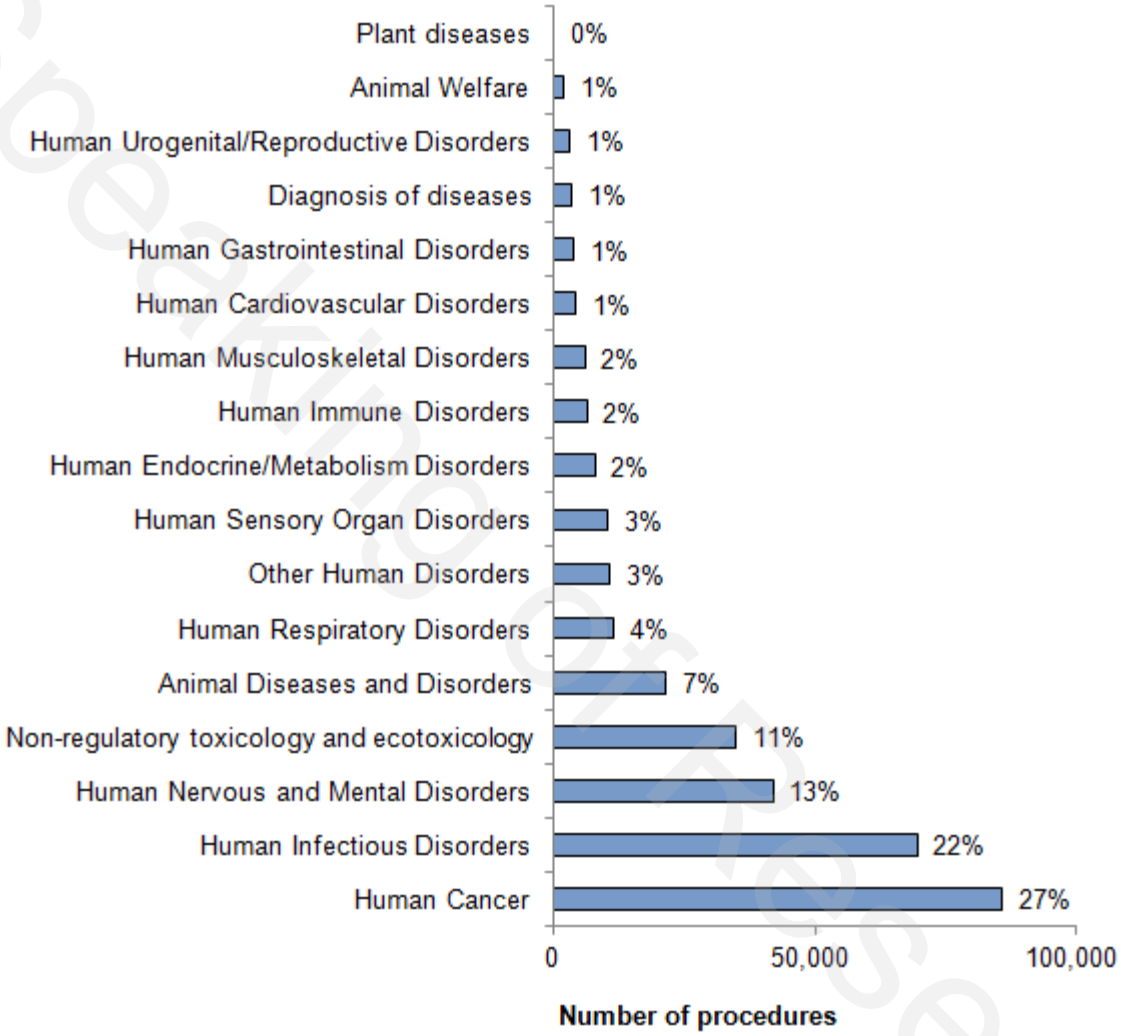
Translational/applied research

There were 322,000 procedures for translational/applied research (17% of all experimental procedures). As shown by Figure 11, the most common research areas were: human cancer (27%), human infectious disorders (22%), and human nervous and mental disorders (13%).

See **data tables** 3.1, 3.2 (online only) and 6 for a breakdown of translational/applied research by species and severity for 2017.

The data shown in Figure 11 have remained similar since 2014, with infectious disorders, cancer, and nervous and mental disorders consistently being reported within the top 5 most common areas for translational/applied research in each year.

Figure 11. Experimental procedures for translational/applied research by sub-purpose, 2017

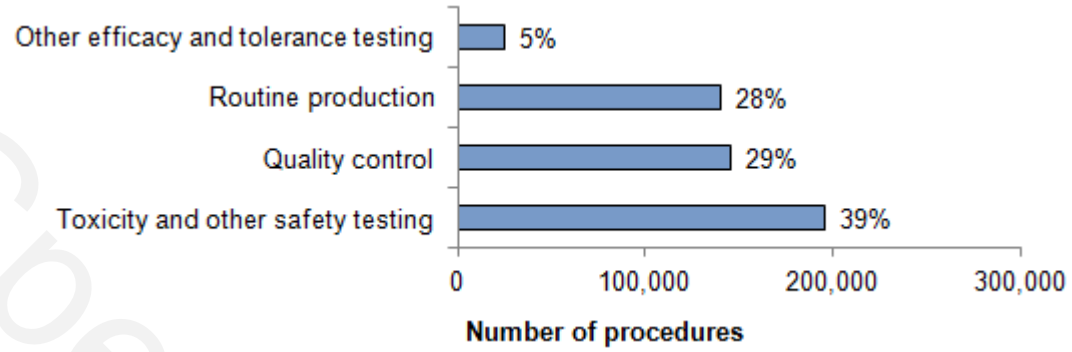


Regulatory

There were 505,000 procedures carried out for regulatory purposes in 2017 (27% of all experimental procedures). Figure 12 shows that the most common reason for regulatory procedures was toxicity and other safety testing (39%). Procedures for quality control and routine production of biological materials (e.g. blood products) accounted for most of the remaining regulatory procedures (29% and 28% respectively).

The figures shown in Figure 12 are similar to those seen in 2016 and 2015. Differences can be seen when compared to 2014 (the first year of recording purpose in this way), although these changes are mostly due to improvements in classification by data suppliers rather than true changes in procedures.

Figure 12. Experimental procedures for regulatory testing by sub-purpose, 2017



All regulatory testing is required by legislation. Of the 505,000 regulatory procedures in 2017, the most common legislative requirements were:

- legislation on medicinal products for human use (41%)
- legislation on medicinal products for veterinary use (23%)
- industrial chemicals legislation (17%)

No procedures were carried out for cosmetics testing.

See **data tables** 3.1, 3.2 (online only), 7.1 and 7.4 for a breakdown of regulatory testing research by species and severity for 2017.

See tables 7.2 and 7.3 for more details on legislative requirements for regulatory testing in 2017.

The majority (95%) of regulatory testing procedures satisfied both UK and EU legislation.

Severity

The severity (i.e. pain, distress or suffering) experienced by animals in procedures has been recorded since 2014. There are five severity assessments:

Sub-threshold: When a procedure was authorised under a project licence but did not actually cause suffering above the threshold of regulation, i.e. was less than the level of pain, suffering, distress or lasting harm that is caused by inserting a hypodermic needle according to good veterinary practice.

Non-recovery (under general anaesthesia): When the entire procedure was carried out under general anaesthesia without recovery.

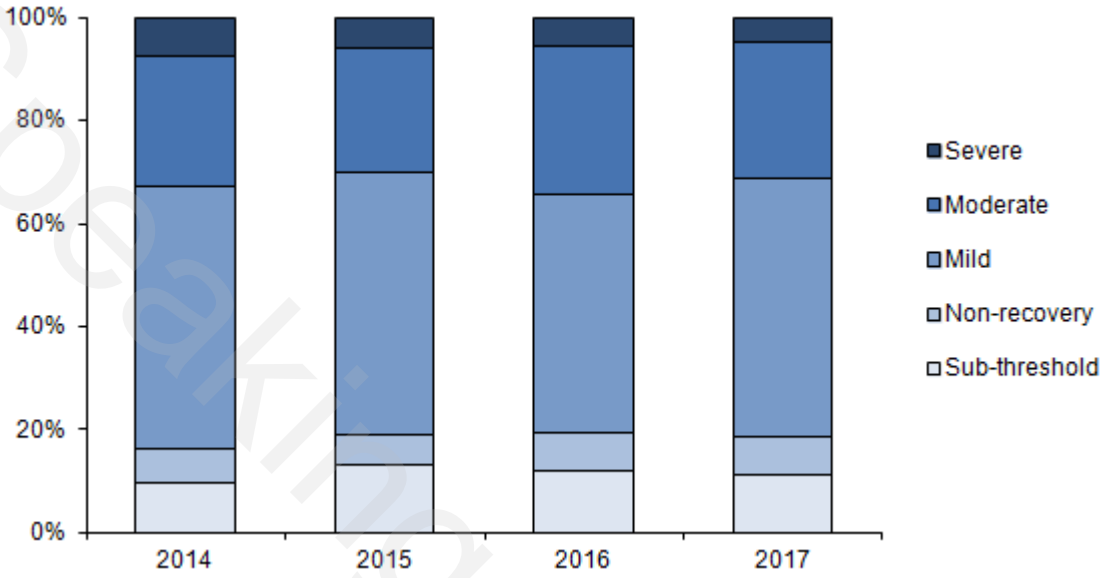
Mild: Any pain or suffering experienced by an animal was, at worst, only slight or transitory and minor so that the animal returns to its normal state within a short period of time.

Moderate: The procedure caused a significant and easily detectable disturbance to an animal's normal state, but this was not life threatening. Most surgical procedures carried out under general anaesthesia and with good post-operative analgesia (i.e. pain relief) would be classed as moderate.

Severe: The procedure caused a major departure from the animal's usual state of health and well-being. This would usually include long-term disease processes where assistance with normal activities such as feeding and drinking were required, or where significant deficits in behaviours/activities persist. It includes animals found dead unless an informed decision can be made that the animal did not suffer severely prior to death.

Severity assessments measure harms to an animal during a procedure and generally reflect the peak severity of the entire procedure; they do not include harms caused to animals as a result of non-procedural events such as transport and housing.

Figure 13. Experimental procedures by severity, 2014-2017

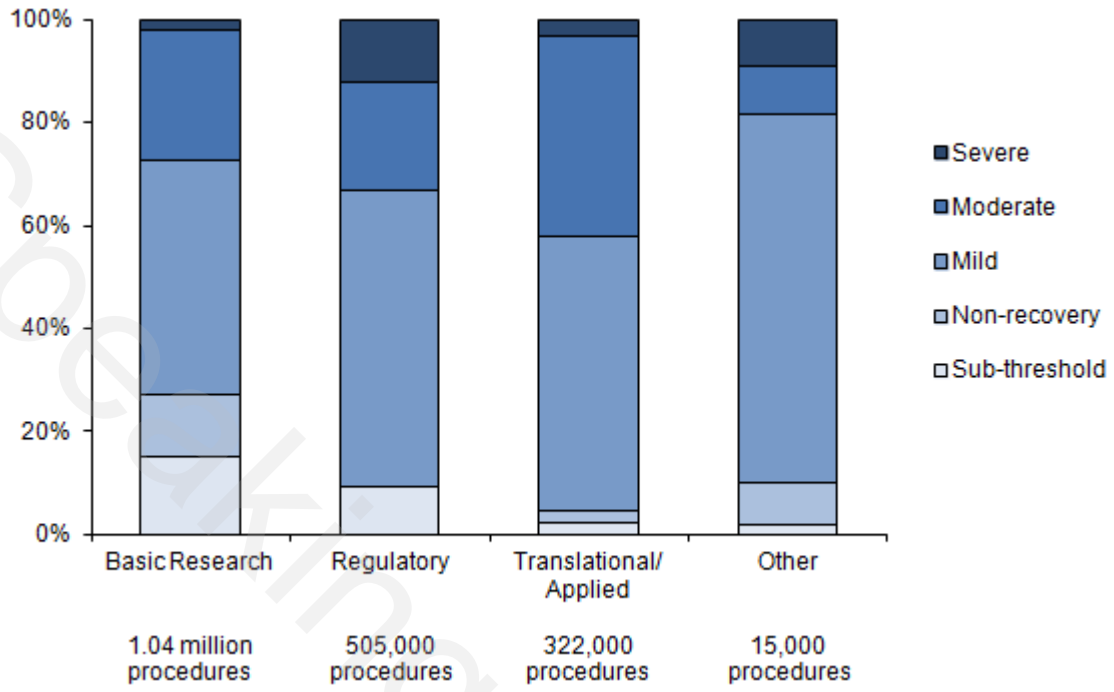


Half of experimental procedures in 2017 were mild (50%). The proportions of severity assessments for procedures reported in 2017, shown in Figure 13, were similar to those seen in previous years. In 2017, mild and moderate assessments accounted for over three quarters (77%) of experimental procedure assessments. Since 2014, sub-threshold procedures have accounted for around 10% of experimental procedures, whilst severe and non-recovery procedures have each accounted for less than 10%.

The severity assessment of experimental procedures varies according to the purpose, as shown in Figure 14. The most common severity assessment was mild, for all experimental purpose classifications.

The data shown in Figure 14 have remained similar since 2014, with minor variation year-on-year. The Home Office continues to provide support to all stakeholders on severity assessment and scoring. Given that information on severity has only been available since 2014, clear trends for this data will take a few years to emerge.

Figure 14. Experimental procedures by severity and purpose, 2017



See **data tables** 3.1 and 3.2 (online only) for a breakdown of severity assessments for experimental procedures in 2017.

Creation/breeding of genetically altered animals

This section covers only procedures counted under the creation/breeding of GA animals. That is, the breeding of animals whose genes have mutated or have been modified. These animals are not used in experimental procedures.

Species

Almost all (over 99%) of the procedures counted under the creation/breeding of GA animals involved mice (89%), fish (11%), and rats (0.4%). Other species used for creation/breeding of GA animals include: amphibians, ungulates (including pigs), and birds – but together these accounted for less than 0.2% of these procedures.

No specially protected species (horses, dogs, cats, or primates) were used in procedures counted under creation/breeding of GA animals.

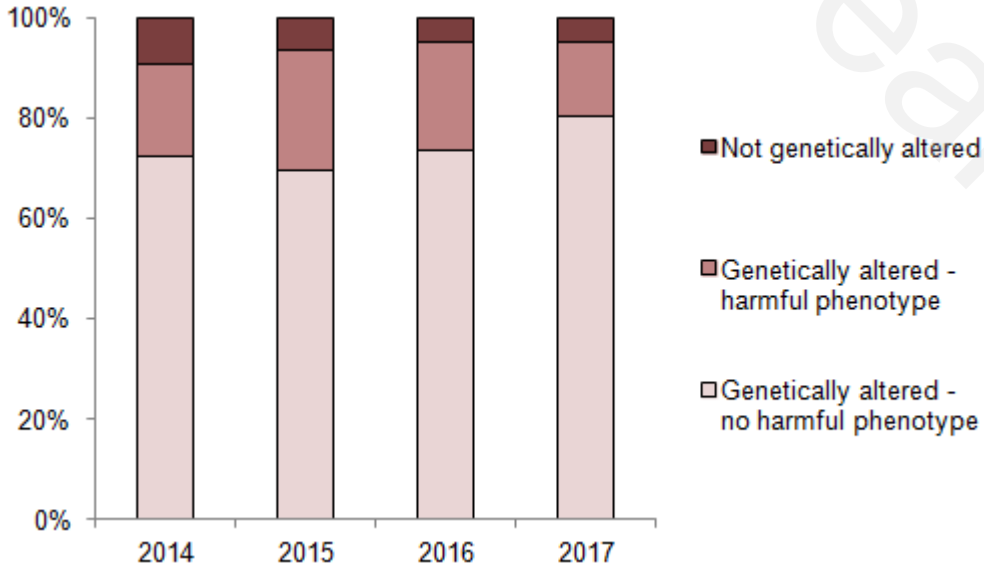
Almost all of the animals used for the creation/breeding of GA animals (99%) were born in the UK at a licensed establishment. In the cases where the animals were sourced from abroad (less than 1%), these were mainly for founding breeding colonies of lines of animals already created elsewhere.

Species have been presented in species groupings here but further breakdowns are available in the **data tables** (tables 8-10). For the first time, further information has been included on other (non-Schedule 2) species – see the 'Further statistics' section later in the report, and table 12 (online only).

Genetic status

The majority (80%) of procedures counted under creation/breeding involved GA animals with no harmful phenotype (i.e. the animals did not appear or behave any differently from non-GA animals).

Figure 15. Creation and breeding of GA animals by type of genetic alteration, 2014-2017



As shown in Figure 15, over the past four years there has been an increase in proportion of animals used for creation/breeding that are GA without a harmful phenotype (rising from 73% of creation/breeding in 2014 to 80% in 2017).

There were some animals that were bred with the intention of producing GA animals, but resulted in non-GA animals being born (5% of animals in this category in 2017). In addition, some animals used for the creation of a new genetic line will also have been genetically normal animals (e.g. those used for superovulation).

Purpose

The creation/breeding of GA animals can be divided into:

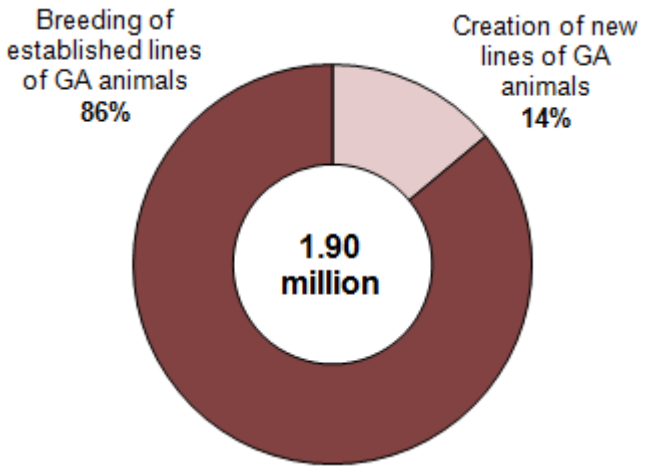
- the creation of new lines of GA animals
- the breeding of established lines of GA animals

Creation of new lines of GA animals: Each procedure involves the use of a standard technique, such as vasectomy or superovulation, in a single animal, for the generation of novel transgenic or mutant lines of GA animals. The birth of each GA animal also counts as a creation procedure when the line is new and before it is 'established' (i.e. stable and characterised).

Breeding of established lines of GA animals: A breeding procedure is the birth of a GA animal of an established strain, as opposed to from a newly created strain. These procedures involve lines of GA animals that are stably transmitted (i.e. where the genetic trait is transmitted to offspring in the expected proportion and with the expected outcome), and have been bred for at least two generations.
Breeding procedures may also include other techniques applied to the animal after birth, such as biopsy to assess the genotype but not any technique applied as part of an experiment or study.

Of the 1.90 million procedures counted under the creation/breeding of GA animals, the majority (86%) were for the breeding of established lines.

Figure 16. Creation/breeding of GA animals by purpose, 2017



See **data tables** 9.1, 9.2 and 9.3 for further detail on the creation of new lines of GA animals, and table 10 for further detail on the breeding of established lines of GA animals.

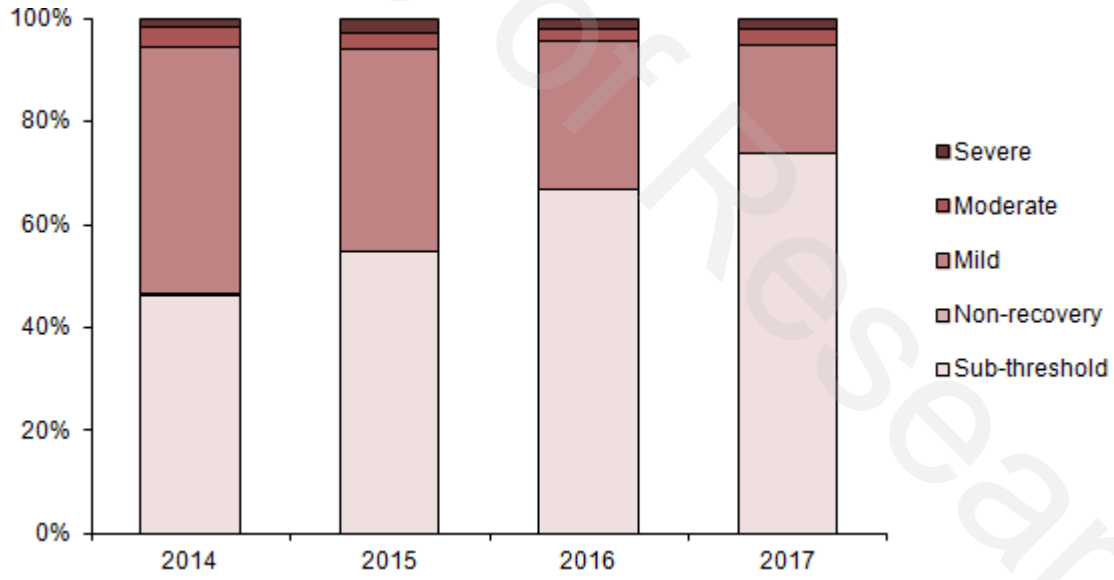
Severity

Animals in this category were not used in regulated experimental procedures. As such, the severity experienced by GA animals created/bred is assessed from:

- the observable characteristics (phenotype) of the animals, e.g. development of congenital disease (i.e. diseases present at birth) or tumours
- in the case of animals that have no harmful phenotype but that have been biopsied specifically for genotyping[3], the biopsy procedures will generally be assessed as mild
- the animals assessed as severe in this category are largely animals within breeding colonies that were found dead and where the death of the animal was either a result of its phenotype or, more commonly, unexplained (all animals found dead are reported as severe unless an informed decision can be made that the animal did not suffer severely prior to death)
- a small number of the animals used to create new lines of GA animals will have been subjected to minor surgery (classed as moderate) or the injection of drugs (classed as mild)

The majority (74%) of procedures counted under creation/breeding in 2017 were assessed as sub-threshold.

Figure 17. Creation and breeding of GA animals by severity, 2014-2017



As shown in Figure 17, 'sub-threshold' procedures have increased and 'mild' have decreased. This change does not reflect a true change in the severity of creation/breeding procedures over the last three years. Home Office Inspectors believe that initially many creation/breeding procedures reported as 'mild' should have been reported as 'sub-threshold'. Therefore the changing severity assessment profile reflects data suppliers improved familiarity and understanding of severity assessments.

See **data tables** 8-10 for further details of creation/breeding procedures by species, genetic status, purpose and severity for 2017.

[3] Genotyping is the process of taking a sample of tissue (a biopsy) and then testing it to determine the genetic make-up of an animal.

Further statistics

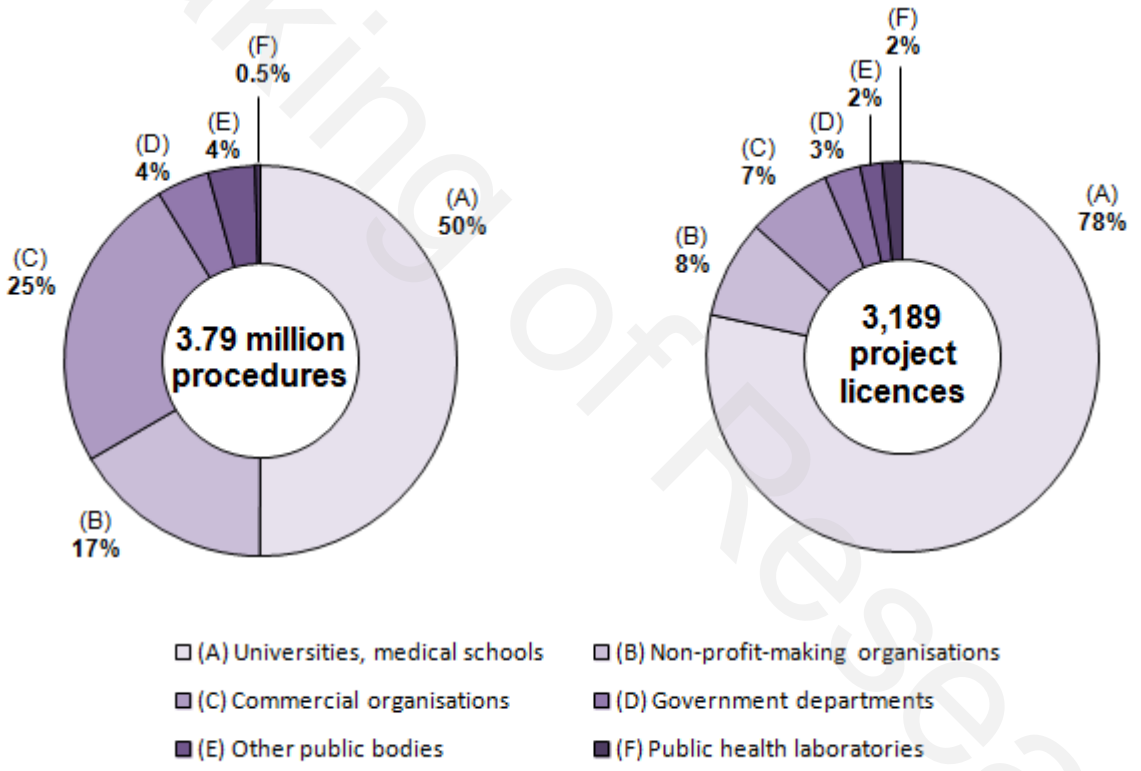
Establishment, project and personal licences

All personnel, projects and establishments seeking to conduct regulated procedures must be licensed.

At the end of 2017, there were:

- 160 establishment licences[4] in force, compared with 167 for the previous year
- 3,189 project licences in force, the same as the previous year;
- 16,109 personal licences in force, compared with 16,178 for the previous year.

Figure 18. Procedures and project licences by establishment, 2017



As shown by Figure 18, universities accounted for the majority of project licences (78%), and the largest proportion of procedures (50%). In contrast, commercial organisations accounted for 7% of the project licences, but 25% of procedures carried out. This is due to commercial organisations conducting large programmes of work involving repetitive procedures and tests under fewer project licences.

See **data table** 11 for further details of project licences and procedures by establishment for 2017.

[4] Of those, 158 were registered as user establishments, 109 as breeding establishments and 75 as supplying establishments. These figures add up to more than the total number of establishments because a single establishment may fall into more than one of the categories. For example, an establishment may be registered as both a breeder and user of animals.

Over the last decade, the number of procedures accounted for by universities/medical schools and non-profit organisations have increased (from 44% to 50% and 4% to 17% respectively), whilst procedures for commercial organisations and other public bodies have decreased (from 36% to 25% and 13% to 4% respectively).

Techniques of special interest

Information was collected on whether any procedures were related to techniques of interest to the Home Office (i.e. areas related to Home Office policies). The areas of interest were: testing of alcohol, tobacco, household products, and the use of ascites models for monoclonal antibody production. Further details of the policies related to these areas of interest can be found in the Annual Reports published by the Animals in Science Regulation Unit.

In 2017, there were 450 experimental procedures (regulatory (toxicity) testing for industrial chemicals legislation) which involved the testing of household product ingredients. No finished household products, tobacco or alcohol products were tested in 2017. No ascites methods of monoclonal antibody production were used in 2017.

Neuromuscular blocking agents and anaesthesia

Neuromuscular blocking agents (NMBA) are used for muscle relaxation during some types of experimental procedure such as nerve stimulation under anaesthesia.

The use of NMBA was recorded in 16 of the 3,189 returns. Of these, 15 returns reported that use of NMBA was whilst the animal was under general anaesthesia.

Rodenticide trials

'Rodenticides' are a category of pest control chemicals intended to kill rodents. Rodenticide trials are field trials of such chemicals and are occasionally undertaken by commercial companies that produce them to assess how safe and effective they are when used.

Of the 3,189 returns, 3 reported that rodenticide trials occurred in 2017. We asked data suppliers only to indicate whether field trials of rodenticide substances occurred, as it is impossible to collect accurate figures on the number of animals used in such field trials.

Use of other species (non-Schedule 2)

For the first time, this release presents further information on the species used in regulated procedures that are not listed in Schedule 2[5]. Overall, non-Schedule 2 species accounted for 102,000 procedures (3% of all procedures carried out in 2017).

There were a total of 170 non-Schedule 2 species used in 2017; the majority of these species were birds and fish; notably, salmon and trout accounted for 37% and 31% of all non-Schedule 2 species, and accounted for 75% of other fish used. The great majority of the salmon and brown trout, and almost half of the rainbow trout, were used for basic research,

[5] The species listed in Schedule 2 are: mice; rats; guinea-pigs; hamsters; gerbils; rabbits; cats; dogs; ferrets; primates; common quail (Coturnix coturnix); any frog of the species Xenopus laevis, Xenopus tropicalis, Rana temporaria or Rana pipiens; zebrafish; genetically modified pigs and genetically modified sheep.

translational research, and protection of the environment, i.e. studies into the biology and behaviour of fish and interactions with the environment. The remaining half of the rainbow trout were used in regulatory testing. Table 12 (online only) of the data tables provides further detail of all non-Schedule 2 species used in 2017.

Use of endangered species

Information was collected on whether any endangered species, as listed in CITES Appendix I[6], were used.

Of the 3,189 returns, 1 reported the use of endangered animals in 2017: specifically, four species of wild birds were used in research for the conservation of the species.

[6] See Appendix I here: https://cites.org/eng/app/appendices.php.

Further information

Accompanying user guide and tables

See the accompanying user guide for information including:

- background information on the data collection and further information on the Animals (Scientific Procedures) Act 1986, including the general system of control
- uses of the statistics, and links to related statistics
- definitions, and explanatory notes for the data tables
- details on methodology and data quality issues

The data tables and time series tables can be found here: https://www.gov.uk/government/statistics/statistics-of-scientific-procedures-on-living-animals-great-britain-2017

Additional statistics for animal use in Great Britain

The annual statistics release covers regulated procedures on living animals, under the Animals (Scientific Procedures) Act (ASPA) 1986. This comprises of the following:

- procedures carried out using animals for experimental purposes
- procedures counted under creation/breeding of genetically altered (GA) animals (i.e. the use of GA animals to create offspring for use in experimental procedures)

The data for the annual statistics are submitted to the Home Office via the 'Return of Procedures' data return.

The use of non-GA animals for breeding, to produce non-GA offspring for use in experimental procedures, is covered under the 1986 Act but is not included in the annual statistics. The annual statistics also do not include the use of other animals 'used' specifically in the support of the production and use of animals in experimental procedures (e.g. sentinel animals for the monitoring of disease within the facilities)

The EU Directive (2010/63/EU) requires that member states must every 5 years, from 2017, collect the above data. As such, for the first time the Home Office collected figures on the breeding of non-GA animals for scientific purposes and all other animals 'used' specifically in the support of the production and use of animals in experimental procedures in 2017. These figures were collected via an 'Additional Data Return', which also collected information on genotyping of animals used in scientific procedures. These statistics will be published on GOV.UK in autumn 2018 and will provide further insight into the use of animals for scientific purposes. The following flowchart shows the process for reporting animals used:

Figure 19. Reporting of animals used for scientific purposes under ASPA

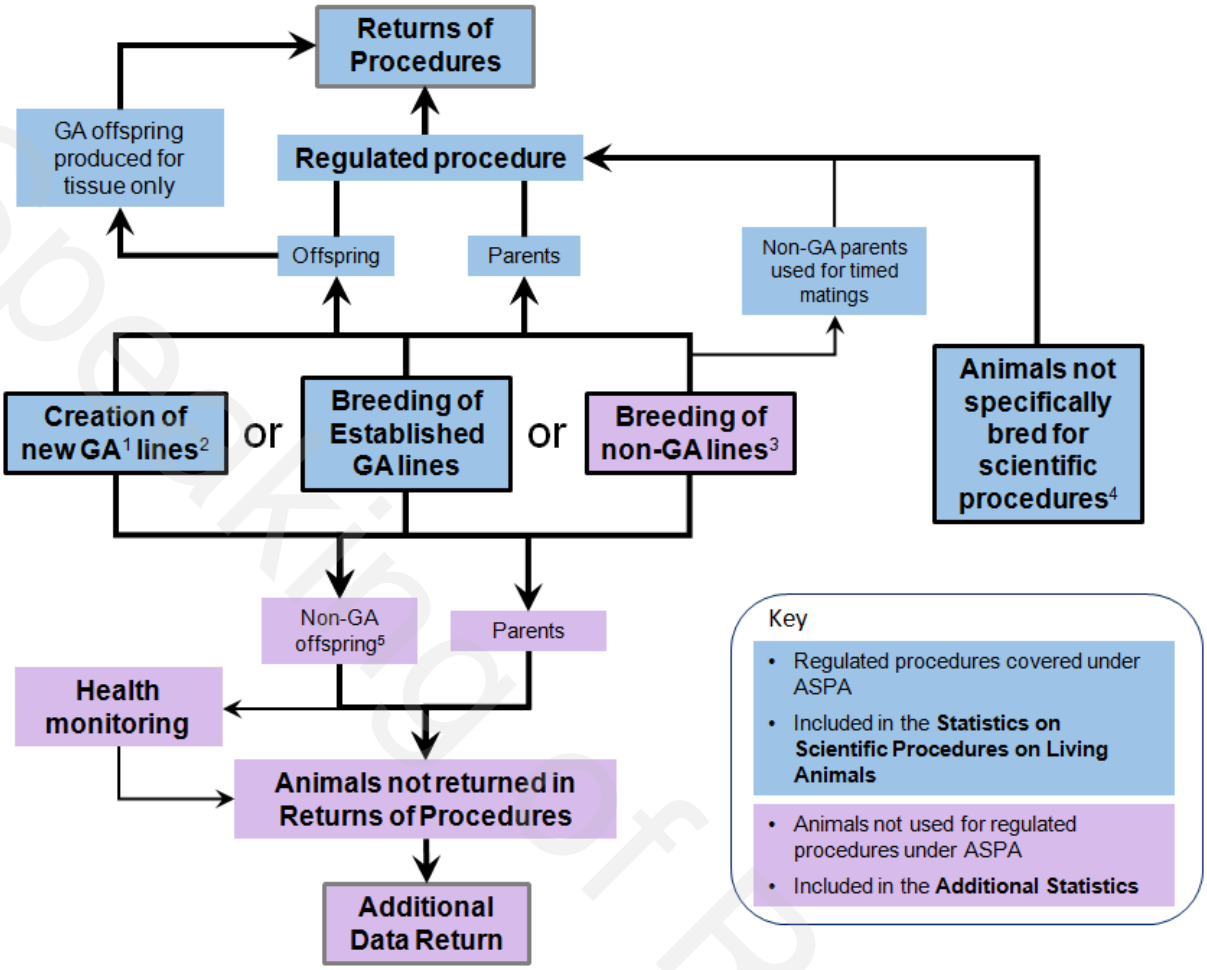


Chart notes:

1. For the purposes of statistical reporting, 'GA' animals include genetically modified (transgenic, knock-out, and other forms of genetic alteration) and naturally occurring or induced mutant animals.
2. A new strain or line of GA animals is considered to be established when the transmission of genetic alteration is stable for at least two generations and a welfare assessment showing no adverse effects from the alteration has been completed. At this point, breeding animals move from the 'Creation of new GA lines' category into the 'Breeding of non-GA lines' category.
3. Spontaneous mutant animals that are to be kept alive are moved into the 'Creation of new GA lines' category.
4. 'Animals not specifically bred for scientific procedures' include, for example, animals sourced from the wild or from commercial livestock farms.
5. Offspring not used for regulated procedures and that are genotyped by methods other than those requiring regulation (e.g. where ear notching is not used for identification) are returned in the 'Additional Data Return'.

Feedback and enquiries

We welcome feedback on the annual statistics release. If you have any feedback or enquiries about this publication, please contact the Fire, Licensing and Public Order Analysis Unit, the Home Office Unit which produced the statistics, via the below details:

FLPOAU@homeoffice.gsi.gov.uk

Fire, Licensing and Public Order Analysis Unit,
14th Floor
Lunar House
40 Wellesley Road
Croydon
CR9 2BY

Tables

Organisation chart

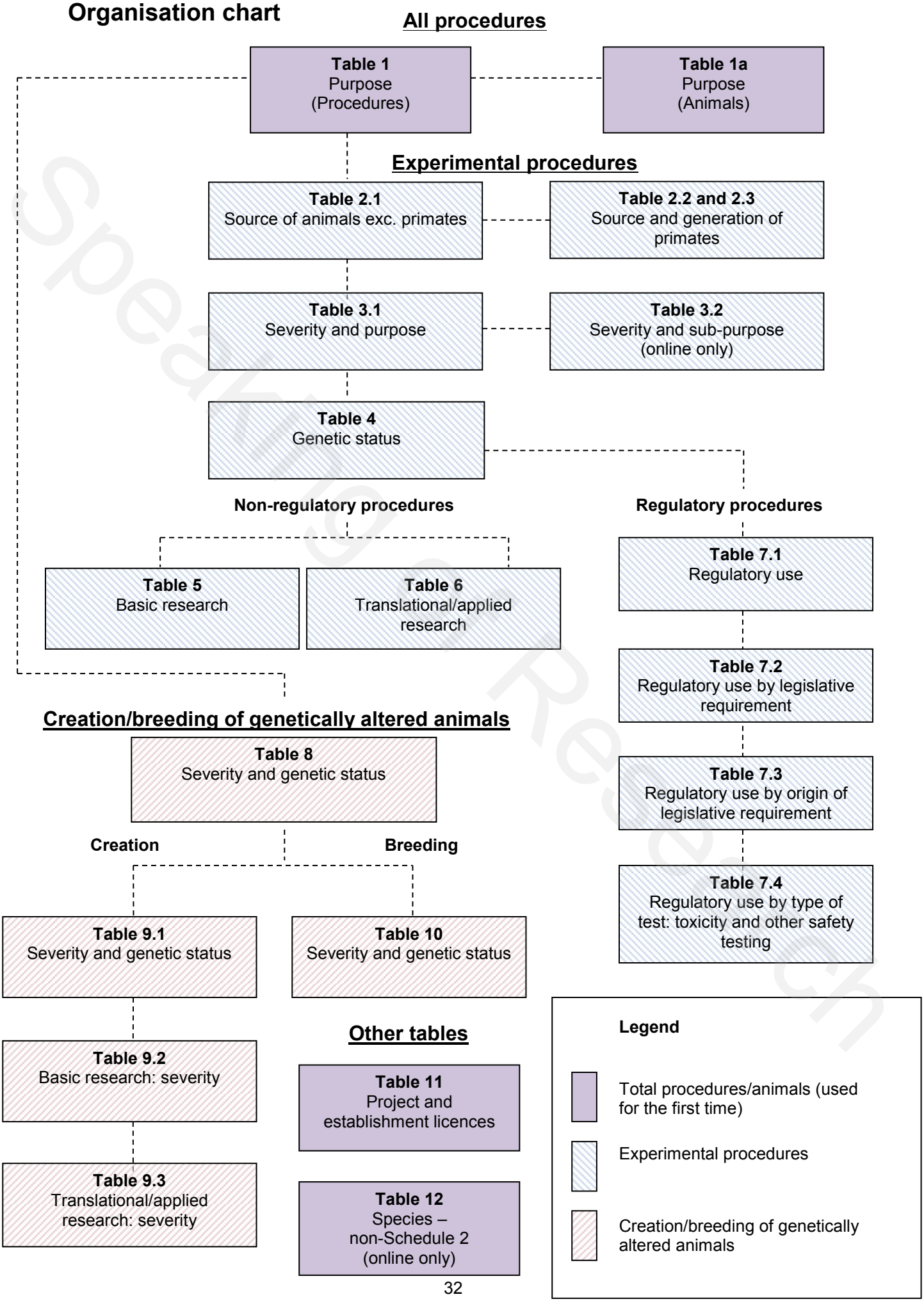


Table 1 Number of procedures by species of animal and purpose of the procedure

Great Britain 2017

Species of animal	Experimental purpose of procedure (excluding creation & breeding)								Creation & breeding of GA animals not used in experimental procedures	Total procedures	% of total procedures
	Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	Total experimental procedures			
Mammal											
Mouse *(Mus musculus)*	738,594	190,776	1,115	226	526	0	163,630	1,094,867	1,686,818	**2,781,685**	**73.4**
Rat *(Rattus norvegicus)*	47,269	39,641	1,457	0	573	0	144,736	233,676	7,868	**241,544**	**6.4**
Guinea-pig *(Cavia porcellus)*	16,439	1,514	0	0	94	0	4,513	22,560	0	**22,560**	**0.6**
Hamster (Syrian) (*Mesocricetus auratus*)	102	536	0	0	0	0	488	1,126	0	**1,126**	**0.0**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	274	37	0	0	0	0	0	311	0	**311**	**0.0**
Other rodent *(other Rodentia)*	1,887	158	60	0	0	0	0	2,105	0	**2,105**	**0.1**
Rabbit *(Oryctolagus cuniculus)*	1,771	782	0	0	2	0	7,807	10,362	0	**10,362**	**0.3**
Cat *(Felis catus)*	177	21	0	0	0	0	0	198	0	**198**	**0.0**
Beagle *(Canis lupus familiaris)*	400	693	15	0	0	0	2,597	3,705	0	**3,705**	**0.1**
Other dog (other *Canis*)	97	45	0	0	0	0	0	142	0	**142**	**0.0**
Ferret *(Mustela putorius furo)*	87	304	0	0	8	0	6	405	0	**405**	**0.0**
Other carnivore (other *Carnivora*)	39	99	84	22	0	0	0	244	0	**244**	**0.0**
Horse and other equid *(Equidae)*	888	86	0	0	0	0	9,626	10,600	0	**10,600**	**0.3**
Pig *(Sus scrofa domesticus)*	493	2,090	0	0	8	0	1,770	4,361	130	**4,491**	**0.1**
Goat *(Capra aegagrus hircus)*	108	108	0	0	0	0	40	256	0	**256**	**0.0**
Sheep *(Ovis aries)*	3,368	1,765	97	0	0	0	42,252	47,482	17	**47,499**	**1.3**
Cattle *(Bos primigenius)*	1,008	583	237	0	0	0	1,016	2,844	0	**2,844**	**0.1**
Primate											
New World monkey											
Marmoset and tamarin	44	122	0	0	0	0	0	166	0	**166**	**0.0**
Old World monkey											
Cynomolgus monkey (*Macaca fascicularis*)	18	231	0	0	0	0	2,413	2,662	0	**2,662**	**0.1**
Rhesus monkey (*Macaca mulatta*)	78	51	0	0	0	0	3	132	0	**132**	**0.0**
Other mammal (other *Mammalia*)	645	20	26	54	0	0	0	745	0	**745**	**0.0**
Bird											
Domestic fowl (*Gallus domesticus*)	3,320	10,542	0	0	0	0	109,878	123,740	1,540	**125,280**	**3.3**
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	20	20	0	**20**	**0.0**
Other bird (other *Aves*)	4,815	469	139	490	0	0	796	6,709	0	**6,709**	**0.2**
Reptile *(Reptilia)*	92	0	0	0	0	0	0	92	0	**92**	**0.0**
Amphibian											
Rana *(temporaria and pipiens)*	108	0	0	0	0	0	0	108	0	**108**	**0.0**
Xenopus *(laevis and tropicalis)*	7,253	185	0	0	15	0	0	7,453	1,348	**8,801**	**0.2**
Other amphibian *(other Amphibia)*	522	0	0	0	0	0	0	522	0	**522**	**0.0**
Fish											
Zebrafish *(Danio rerio)*	153,240	62,986	288	140	9	0	447	217,110	205,028	**422,138**	**11.1**
Other fish (other *Pisces*)	60,518	8,542	8,134	993	0	0	13,043	91,230	691	**91,921**	**2.4**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**1,043,654**	**322,386**	**11,652**	**1,925**	**1,235**	**0**	**505,081**	**1,885,933**	**1,903,440**	**3,789,373**	**100.0**
% of total	**27.5**	**8.5**	**0.3**	**0.1**	**0.0**	**0.0**	**13.3**	**49.8**	**50.2**	**100.0**	

Table 1a Number of animals used for the first time in procedures by species of animal and purpose of the procedure

Great Britain 2017

Species of animal	Experimental purpose of procedure (excluding creation & breeding)								Creation & breeding of GA animals not used in experimental procedures	Total animals used for the first time in procedures	% of total animals used for the first time in procedures
	Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	Total animals used for the first time in experimental procedures			
Mammal											
Mouse *(Mus musculus)*	738,145	190,304	1,115	226	526	0	163,618	1,093,934	1,686,424	**2,780,358**	**74.7**
Rat *(Rattus norvegicus)*	46,444	37,643	1,457	0	573	0	144,553	230,670	7,868	**238,538**	**6.4**
Guinea-pig *(Cavia porcellus)*	16,439	1,514	0	0	94	0	4,513	22,560	0	**22,560**	**0.6**
Hamster (Syrian) (*Mesocricetus auratus*)	102	536	0	0	0	0	488	1,126	0	**1,126**	**0.0**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	270	37	0	0	0	0	0	307	0	**307**	**0.0**
Other rodent *(*other *Rodentia)*	1,887	158	60	0	0	0	0	2,105	0	**2,105**	**0.1**
Rabbit *(Oryctolagus cuniculus)*	1,711	552	0	0	2	0	7,233	9,498	0	**9,498**	**0.3**
Cat *(Felis catus)*	50	21	0	0	0	0	0	71	0	**71**	**0.0**
Beagle *(Canis lupus familiaris)*	45	200	15	0	0	0	2,186	2,446	0	**2,446**	**0.1**
Other dog (other *Canis*)	23	27	0	0	0	0	0	50	0	**50**	**0.0**
Ferret *(Mustela putorius furo)*	87	304	0	0	8	0	6	405	0	**405**	**0.0**
Other carnivore (other *Carnivora*)	39	90	84	22	0	0	0	235	0	**235**	**0.0**
Horse and other equid *(Equidae)*	80	21	0	0	0	0	187	288	0	**288**	**0.0**
Pig *(Sus scrofa domesticus)*	487	1,964	0	0	8	0	1,760	4,219	130	**4,349**	**0.1**
Goat *(Capra aegagrus hircus)*	108	108	0	0	0	0	40	256	0	**256**	**0.0**
Sheep *(Ovis aries)*	3,105	1,402	97	0	0	0	358	4,962	17	**4,979**	**0.1**
Cattle *(Bos primigenius)*	811	496	237	0	0	0	1,016	2,560	0	**2,560**	**0.1**
Primate											
New World monkey											
Marmoset and tamarin	37	73	0	0	0	0	0	110	0	**110**	**0.0**
Old World monkey											
Cynomolgus monkey (*Macaca fascicularis*)	15	68	0	0	0	0	1,940	2,023	0	**2,023**	**0.1**
Rhesus monkey (*Macaca mulatta*)	29	50	0	0	0	0	3	82	0	**82**	**0.0**
Other mammal (other *Mammalia*)	645	8	26	54	0	0	0	733	0	**733**	**0.0**
Bird											
Domestic fowl (*Gallus domesticus*)	3,320	10,515	0	0	0	0	109,878	123,713	1,540	**125,253**	**3.4**
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	20	20	0	**20**	**0.0**
Other bird (other *Aves*)	4,501	336	116	489	0	0	796	6,238	0	**6,238**	**0.2**
Reptile *(Reptilia)*	92	0	0	0	0	0	0	92	0	**92**	**0.0**
Amphibian											
Rana *(temporaria and pipiens)*	108	0	0	0	0	0	0	108	0	**108**	**0.0**
Xenopus *(laevis and tropicalis)*	2,499	31	0	0	0	0	0	2,530	1,149	**3,679**	**0.1**
Other amphibian *(*other *Amphibia)*	522	0	0	0	0	0	0	522	0	**522**	**0.0**
Fish											
Zebrafish *(Danio rerio)*	152,801	62,986	288	140	9	0	447	216,671	204,311	**420,982**	**11.3**
Other fish (other *Pisces*)	60,368	8,542	8,134	993	0	0	13,043	91,080	691	**91,771**	**2.5**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**1,034,770**	**317,986**	**11,629**	**1,924**	**1,220**	**0**	**452,085**	**1,819,614**	**1,902,130**	**3,721,744**	**100.0**
% of total	**27.8**	**8.5**	**0.3**	**0.1**	**0.0**	**0.0**	**12.1**	**48.9**	**51.1**	**100.0**	

Table 2.1 Place of birth of animals used for the first time in experimental procedures by species of animal (excludes non-human primates)

Great Britain 2017

Species of animal	Place of birth						Total	% of total
	Animals born in the UK at a licensed establishment	Animals born in the UK but **not** at a licensed establishment	Animals born elsewhere in the EU at a registered breeder	Animals born elsewhere in the EU but **not** at a registered breeder	Animals born in rest of Europe	Animals born in rest of world		
Mammal								
Mouse *(Mus musculus)**	1,070,371	0	19,589	0	4	3,970	**1,093,934**	**60.2**
Rat *(Rattus norvegicus)**	222,062	1,141	6,974	0	1	492	**230,670**	**12.7**
Guinea-pig *(Cavia porcellus)**	22,221	0	339	0	0	0	**22,560**	**1.2**
Hamster (Syrian) (*Mesocricetus auratus*)*	620	0	178	0	0	328	**1,126**	**0.1**
Hamster (chinese) (*Cricetulus griseus*)*	0	0	0	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)**	246	0	61	0	0	0	**307**	**0.0**
Other rodent *(*other *Rodentia)*	414	1,533	0	0	0	158	**2,105**	**0.1**
Rabbit *(Oryctolagus cuniculus)*	7,398	0	857	0	0	1,243	**9,498**	**0.5**
Cat *(Felis catus)*	21	21	29	0	0	0	**71**	**0.0**
Beagle *(Canis lupus familiaris)*	1,155	0	90	0	0	1,201	**2,446**	**0.1**
Other dog (other *Canis*)	0	50	0	0	0	0	**50**	**0.0**
Ferret *(Mustela putorius furo)*	387	0	18	0	0	0	**405**	**0.0**
Other carnivore (other *Carnivora*)	0	235	0	0	0	0	**235**	**0.0**
Horse and other equid *(Equidae)*	66	202	0	20	0	0	**288**	**0.0**
Pig *(Sus scrofa domesticus)*	1,047	2,443	699	0	30	0	**4,219**	**0.2**
Goat *(Capra aegagrus hircus)*	0	256	0	0	0	0	**256**	**0.0**
Sheep *(Ovis aries)*	1,845	3,096	3	18	0	0	**4,962**	**0.3**
Cattle *(Bos primigenius)*	673	1,837	0	50	0	0	**2,560**	**0.1**
Other mammal *(*other *Mammalia)*	0	733	0	0	0	0	**733**	**0.0**
Bird								
Domestic fowl (*Gallus domesticus*)	98,932	24,781	0	0	0	0	**123,713**	**6.8**
Quail *(Coturnix coturnix)*	0	10	0	10	0	0	**20**	**0.0**
Other bird *(*other *Aves)*	1,151	4,681	10	320	4	72	**6,238**	**0.3**
Reptile *(Reptilia)*	0	0	0	0	10	82	**92**	**0.0**
Amphibian								
Rana *(temporaria and pipiens)**	0	108	0	0	0	0	**108**	**0.0**
Xenopus *(laevis and tropicalis)**	2,118	0	2	0	0	410	**2,530**	**0.1**
Other amphibian *(*other *Amphibia)*	0	417	0	104	1	0	**522**	**0.0**
Fish								
Zebrafish *(Danio rerio)**	215,570	0	407	0	0	694	**216,671**	**11.9**
Other fish *(*other *Pisces)*	17,788	62,919	5,139	559	3,179	1,496	**91,080**	**5.0**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	**0**	**0.0**
Total	**1,664,085**	**104,463**	**34,395**	**1,081**	**3,229**	**10,146**	**1,817,399**	**100.0**
% of total	**91.6**	**5.7**	**1.9**	**0.1**	**0.2**	**0.6**	**100.0**	

* Denotes species listed in Schedule 2; pigs and sheep are only listed in Schedule 2 if they are genetically altered.

Table 2.2 Place of birth of non-human primates[1] used for the first time in experimental procedures by species of primate

Great Britain 2017

Species of primate	Place of birth							Total	% of total
	Animals born in the UK at a licensed establishment	Animals born at a registered breeder elsewhere within EU	Animals born in rest of Europe	Animals born in Asia	Animals born in America	Animals born in Africa	Animals born elsewhere		
Primate									
New World monkey									
Marmoset and tamarin	110	0	0	0	0	0	0	**110**	**5.0**
Old World monkey									
Cynomolgus monkey (*Macaca fascicularis*)	64	0	0	616	0	1,343	0	**2,023**	**91.3**
Rhesus monkey (*Macaca mulatta*)	79	0	0	0	0	3	0	**82**	**3.7**
Total	**253**	**0**	**0**	**616**	**0**	**1,346**	**0**	**2,215**	**100.0**
% of total	**11.4**	**0.0**	**0.0**	**27.8**	**0.0**	**60.8**	**0.0**	**100.0**	

1. All primate species are listed in Schedule 2 of the Animals (Scientific Procedures) Act 1986.

Table 2.3 Generation of non-human primates[1] used for the first time in experimental procedures by species of primate

Great Britain 2017

Species of primate	Generation				Total	% of total
	Wild caught	First generation	Second generation or greater	Self-sustaining colony		
Primate						
New World monkey						
Marmoset and tamarin	0	0	0	110	**110**	**5.0**
Old World monkey						
Cynomolgus monkey (*Macaca fascicularis*)	0	1	581	1,441	**2,023**	**91.3**
Rhesus monkey (*Macaca mulatta*)	0	0	6	76	**82**	**3.7**
Total	**0**	**1**	**587**	**1,627**	**2,215**	**100.0**
% of total	**0.0**	**0.0**	**26.5**	**73.5**	**100.0**	

1. All primate species are listed in Schedule 2 of the Animals (Scientific Procedures) Act 1986.

Table 3.1 Experimental procedures by species of animal, severity and purpose of the procedure, page 1 of 2

Great Britain 2017

Species of animal[1]	Actual Severity	Experimental purpose of procedure							Total	% of species total
		Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory		
Mouse (*Mus musculus*)	Sub threshold	120,688	5,678	0	226	0	0	54	126,646	11.6
	Non - recovery	82,554	4,856	0	0	109	0	109	87,628	8.0
	Mild	286,871	84,862	981	0	417	0	55,415	428,546	39.1
	Moderate	231,901	89,199	80	0	0	0	52,389	373,569	34.1
	Severe	16,580	6,181	54	0	0	0	55,663	78,478	7.2
	Total	**738,594**	**190,776**	**1,115**	**226**	**526**	**0**	**163,630**	**1,094,867**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	1,141	8	0	0	0	0	38,968	40,117	17.2
	Non - recovery	19,861	1,884	0	0	524	0	271	22,540	9.6
	Mild	9,797	17,300	125	0	49	0	64,602	91,873	39.3
	Moderate	15,527	20,172	85	0	0	0	40,228	76,012	32.5
	Severe	943	277	1,247	0	0	0	667	3,134	1.3
	Total	**47,269**	**39,641**	**1,457**	**0**	**573**	**0**	**144,736**	**233,676**	**100.0**
Guinea-pig (*Cavia porcellus*)	Sub threshold	0	0	0	0	0	0	0	0	0.0
	Non - recovery	15,753	77	0	0	75	0	55	15,960	70.7
	Mild	168	1,186	0	0	19	0	1,549	2,922	13.0
	Moderate	515	203	0	0	0	0	951	1,669	7.4
	Severe	3	48	0	0	0	0	1,958	2,009	8.9
	Total	**16,439**	**1,514**	**0**	**0**	**94**	**0**	**4,513**	**22,560**	**100.0**
Other rodent[2]	Sub threshold	34	0	1	0	0	0	0	35	1.0
	Non - recovery	69	8	1	0	0	0	0	78	2.2
	Mild	1,807	369	33	0	0	0	465	2,674	75.5
	Moderate	342	96	11	0	0	0	23	472	13.3
	Severe	11	258	14	0	0	0	0	283	8.0
	Total	**2,263**	**731**	**60**	**0**	**0**	**0**	**488**	**3,542**	**100.0**
Rabbit (*Oryctolagus cuniculus*)	Sub threshold	0	0	0	0	0	0	84	84	0.8
	Non - recovery	900	66	0	0	2	0	115	1,083	10.5
	Mild	690	455	0	0	0	0	5,867	7,012	67.7
	Moderate	142	171	0	0	0	0	1,718	2,031	19.6
	Severe	39	90	0	0	0	0	23	152	1.5
	Total	**1,771**	**782**	**0**	**0**	**2**	**0**	**7,807**	**10,362**	**100.0**
Cat (*Felis catus*)	Sub threshold	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0.0
	Mild	172	19	0	0	0	0	0	191	96.5
	Moderate	5	1	0	0	0	0	0	6	3.0
	Severe	0	1	0	0	0	0	0	1	0.5
	Total	**177**	**21**	**0**	**0**	**0**	**0**	**0**	**198**	**100.0**
Dog[3]	Sub threshold	2	0	0	0	0	0	0	2	0.1
	Non - recovery	28	0	0	0	0	0	10	38	1.0
	Mild	467	609	15	0	0	0	1,687	2,778	72.2
	Moderate	0	129	0	0	0	0	885	1,014	26.4
	Severe	0	0	0	0	0	0	15	15	0.4
	Total	**497**	**738**	**15**	**0**	**0**	**0**	**2,597**	**3,847**	**100.0**
Ferret (*Mustela putorius furo*)	Sub threshold	0	0	0	0	0	0	0	0	0.0
	Non - recovery	2	0	0	0	8	0	6	16	4.0
	Mild	62	280	0	0	0	0	0	342	84.4
	Moderate	23	24	0	0	0	0	0	47	11.6
	Severe	0	0	0	0	0	0	0	0	0.0
	Total	**87**	**304**	**0**	**0**	**8**	**0**	**6**	**405**	**100.0**
Horse and other equid (*Equidae*)	Sub threshold	9	0	0	0	0	0	0	9	0.1
	Non - recovery	0	0	0	0	0	0	0	0	0.0
	Mild	879	86	0	0	0	0	9,618	10,583	99.8
	Moderate	0	0	0	0	0	0	8	8	0.1
	Severe	0	0	0	0	0	0	0	0	0.0
	Total	**888**	**86**	**0**	**0**	**0**	**0**	**9,626**	**10,600**	**100.0**
Pig (*Sus scrofa domesticus*)	Sub threshold	3	97	0	0	0	0	178	278	6.4
	Non - recovery	58	458	0	0	8	0	0	524	12.0
	Mild	365	1,098	0	0	0	0	1,259	2,722	62.4
	Moderate	67	437	0	0	0	0	328	832	19.1
	Severe	0	0	0	0	0	0	5	5	0.1
	Total	**493**	**2,090**	**0**	**0**	**8**	**0**	**1,770**	**4,361**	**100.0**
Other ungulate[4]	Sub threshold	0	2	0	0	0	0	12	14	0.0
	Non - recovery	4	214	0	0	0	0	0	218	0.4
	Mild	4,029	1,886	326	0	0	0	43,162	49,403	97.7
	Moderate	451	346	8	0	0	0	134	939	1.9
	Severe	0	8	0	0	0	0	0	8	0.0
	Total	**4,484**	**2,456**	**334**	**0**	**0**	**0**	**43,308**	**50,582**	**100.0**
Other mammal (other *Mammalia*)	Sub threshold	0	0	3	0	0	0	0	3	0.3
	Non - recovery	0	0	0	0	0	0	0	0	0.0
	Mild	684	38	39	76	0	0	0	837	84.6
	Moderate	0	81	1	0	0	0	0	82	8.3
	Severe	0	0	67	0	0	0	0	67	6.8
	Total	**684**	**119**	**110**	**76**	**0**	**0**	**0**	**989**	**100.0**

Table 3.1 Experimental procedures by species of animal, severity and purpose of the procedure, page 2 of 2

Great Britain 2017

Species of animal[1]	Severity	Experimental purpose of procedure								% of species total
		Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	**Total**	
Primate	Sub threshold	0	0	0	0	0	0	0	0	0.0
	Non - recovery	8	2	0	0	0	0	4	14	0.5
	Mild	65	338	0	0	0	0	1,479	1,882	63.6
	Moderate	67	55	0	0	0	0	929	1,051	35.5
	Severe	0	9	0	0	0	0	4	13	0.4
	Total	**140**	**404**	**0**	**0**	**0**	**0**	**2,416**	**2,960**	**100.0**
Bird	Sub threshold	251	36	0	0	0	0	3,840	4,127	3.2
	Non - recovery	118	0	0	0	0	0	0	118	0.1
	Mild	7,040	9,406	139	490	0	0	102,366	119,441	91.5
	Moderate	718	1,165	0	0	0	0	3,943	5,826	4.5
	Severe	8	404	0	0	0	0	545	957	0.7
	Total	**8,135**	**11,011**	**139**	**490**	**0**	**0**	**110,694**	**130,469**	**100.0**
Reptile	Sub threshold	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	0	0	0	0	0	0.0
	Moderate	92	0	0	0	0	0	0	92	100.0
	Severe	0	0	0	0	0	0	0	0	0.0
	Total	**92**	**0**	**0**	**0**	**0**	**0**	**0**	**92**	**100.0**
Amphibian	Sub threshold	20	0	0	0	0	0	0	20	0.2
	Non - recovery	10	0	0	0	0	0	0	10	0.1
	Mild	7,179	185	0	0	15	0	0	7,379	91.3
	Moderate	23	0	0	0	0	0	0	23	0.3
	Severe	651	0	0	0	0	0	0	651	8.1
	Total	**7,883**	**185**	**0**	**0**	**15**	**0**	**0**	**8,083**	**100.0**
Fish	Sub threshold	34,349	602	0	0	0	0	2,589	37,540	12.2
	Non - recovery	6,306	16	467	0	9	0	4	6,802	2.2
	Mild	156,429	53,797	7,444	458	0	0	3,803	221,931	72.0
	Moderate	13,391	13,548	511	675	0	0	4,690	32,815	10.6
	Severe	3,283	3,565	0	0	0	0	2,404	9,252	3.0
	Total	**213,758**	**71,528**	**8,422**	**1,133**	**9**	**0**	**13,490**	**308,340**	**100.0**
All species	Sub threshold	156,497	6,423	4	226	0	0	45,725	208,875	11.1
	Non - recovery	125,671	7,581	468	0	735	0	574	135,029	7.2
	Mild	476,704	171,914	9,102	1,024	500	0	291,272	950,516	50.4
	Moderate	263,264	125,627	696	675	0	0	106,226	496,488	26.3
	Severe	21,518	10,841	1,382	0	0	0	61,284	95,025	5.0
	Total	**1,043,654**	**322,386**	**11,652**	**1,925**	**1,235**	**0**	**505,081**	**1,885,933**	**100.0**

1. Some species were not displayed on this table as they were not used in any relevant procedures in 2017.
2. "Other rodent" includes Syrian hamster (*Mesocricetus auratus*), Chinese hamster (*Cricetulus griseus*), Mongolian gerbil (*Meriones unguiculatus*), and other rodents (other *Rodentia*).
3. "Dog" includes beagles (*Canis lupus familiaris*) and other dogs (other *Canis*)
4. "Other ungulate" includes goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and cattle (*Bos primigenius*).

Table 4 Experimental procedures by species of animal and genetic status

Great Britain 2017

Species of animal	Genetic status			Total	% of total
	Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mammal					
Mouse *(Mus musculus)*	562,441	422,235	110,191	**1,094,867**	**58.1**
Rat *(Rattus norvegicus)*	228,942	3,501	1,233	**233,676**	**12.4**
Guinea-pig *(Cavia porcellus)*	22,560	0	0	**22,560**	**1.2**
Hamster (Syrian) (*Mesocricetus auratus*)	1,126	0	0	**1,126**	**0.1**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	311	0	0	**311**	**0.0**
Other rodent *(*other *Rodentia)*	2,105	0	0	**2,105**	**0.1**
Rabbit *(Oryctolagus cuniculus)*	10,362	0	0	**10,362**	**0.5**
Cat *(Felis catus)*	198	0	0	**198**	**0.0**
Beagle *(Canis lupus familiaris)*	3,689	0	16	**3,705**	**0.2**
Other dog (other *Canis*)	142	0	0	**142**	**0.0**
Ferret *(Mustela putorius furo)*	405	0	0	**405**	**0.0**
Other carnivore *(*other *Carnivora)*	244	0	0	**244**	**0.0**
Horse and other equid *(Equidae)*	10,600	0	0	**10,600**	**0.6**
Pig *(Sus scrofa domesticus)*	4,358	0	3	**4,361**	**0.2**
Goat *(Capra aegagrus hircus)*	256	0	0	**256**	**0.0**
Sheep *(Ovis aries)*	47,477	0	5	**47,482**	**2.5**
Cattle *(Bos primigenius)*	2,844	0	0	**2,844**	**0.2**
Primate					
New World monkey					
Marmoset and tamarin	166	0	0	**166**	**0.0**
Old World monkey					
Cynomolgus monkey (*Macaca fascicularis*)	2,662	0	0	**2,662**	**0.1**
Rhesus monkey (*Macaca mulatta*)	128	4	0	**132**	**0.0**
Other mammal *(*other *Mammalia)*	745	0	0	**745**	**0.0**
Bird					
Domestic fowl (*Gallus domesticus*)	123,121	619	0	**123,740**	**6.6**
Quail *(Coturnix coturnix)*	20	0	0	**20**	**0.0**
Other bird *(*other *Aves)*	6,709	0	0	**6,709**	**0.4**
Reptile *(Reptilia)*	92	0	0	**92**	**0.0**
Amphibian					
Rana *(temporaria and pipiens)*	108	0	0	**108**	**0.0**
Xenopus *(laevis and tropicalis)*	6,498	955	0	**7,453**	**0.4**
Other amphibian *(*other *Amphibia)*	522	0	0	**522**	**0.0**
Fish					
Zebrafish *(Danio rerio)*	36,546	165,733	14,831	**217,110**	**11.5**
Other fish *(*other *Pisces)*	91,230	0	0	**91,230**	**4.8**
Cephalopod *(Cephalopoda)*	0	0	0	**0**	**0.0**
Total	**1,166,607**	**593,047**	**126,279**	**1,885,933**	**100.0**
% of total	**61.9**	**31.4**	**6.7**	**100.0**	

Table 5 Experimental procedures (non-regulatory) by species of animal: basic research

Great Britain 2017

Species of animal	Basic Research													Total	% of total
	Oncology	Cardiovascular Blood and Lymphatic System	Nervous System	Respiratory System	Gastrointestinal System including Liver	Musculoskeletal System[1]	Immune System	Urogenital/ Reproductive System	Sensory Organs (skin, eyes and ears)	Endocrine System/ Metabolism	Multisystemic	Ethology / Animal Behaviour /Animal Biology	Other		
Mammal															
Mouse *(Mus musculus)*	108,418	52,213	143,485	9,829	20,895	17,449	190,128	26,541	12,684	21,685	56,639	1,153	77,475	**738,594**	**70.8**
Rat *(Rattus norvegicus)*	253	6,200	21,219	299	280	499	685	438	117	1,125	2,913	197	13,044	**47,269**	**4.5**
Guinea-pig *(Cavia porcellus)*	0	156	101	489	0	0	72	1	6	0	7	0	15,607	**16,439**	**1.6**
Hamster (Syrian) (*Mesocricetus auratus*)	0	0	8	0	0	0	94	0	0	0	0	0	0	**102**	**0.0**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	0	0	61	0	0	0	35	0	21	0	0	0	157	**274**	**0.0**
Other rodent *(*other *Rodentia)*	0	0	49	0	0	0	1,301	0	0	253	111	173	0	**1,887**	**0.2**
Rabbit *(Oryctolagus cuniculus)*	0	375	13	6	68	2	286	30	30	0	0	0	961	**1,771**	**0.2**
Cat *(Felis catus)*	0	0	2	0	0	0	0	0	0	9	166	0	0	**177**	**0.0**
Beagle *(Canis lupus familiaris)*	0	0	0	0	2	0	0	0	0	0	8	0	390	**400**	**0.0**
Other dog (other *Canis*)	0	0	0	0	12	15	35	0	0	2	33	0	0	**97**	**0.0**
Ferret *(Mustela putorius furo)*	0	0	25	62	0	0	0	0	0	0	0	0	0	**87**	**0.0**
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	0	0	0	0	39	0	**39**	**0.0**
Horse and other equid *(Equidae)*	0	0	0	0	0	20	350	0	0	518	0	0	0	**888**	**0.1**
Pig *(Sus scrofa domesticus)*	0	38	73	39	36	16	225	1	0	0	18	39	8	**493**	**0.0**
Goat *(Capra aegagrus hircus)*	0	0	0	0	0	0	106	0	0	0	0	0	2	**108**	**0.0**
Sheep *(Ovis aries)*	0	132	38	10	205	781	1,225	23	0	105	20	398	431	**3,368**	**0.3**
Cattle *(Bos primigenius)*	0	16	0	95	249	0	479	0	0	0	169	0	0	**1,008**	**0.1**
Primate															
New World monkey															
Marmoset and tamarin	0	0	38	0	0	0	0	0	0	0	6	0	0	**44**	**0.0**
Old World monkey															
Cynomolgus monkey (*Macaca fascicularis*)	0	5	0	0	0	2	0	0	0	0	7	0	4	**18**	**0.0**
Rhesus monkey (*Macaca mulatta*)	0	51	21	0	0	0	0	0	0	0	4	0	2	**78**	**0.0**
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	0	0	0	0	558	87	**645**	**0.1**
Bird															
Domestic fowl (*Gallus domesticus*)	48	48	12	0	1,030	0	1,102	0	0	301	54	36	689	**3,320**	**0.3**
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Other bird (other *Aves*)	0	217	0	0	0	15	0	0	0	423	0	3,723	437	**4,815**	**0.5**
Reptile *(Reptilia)*	0	82	0	0	0	10	0	0	0	0	0	0	0	**92**	**0.0**
Amphibian															
Rana *(temporaria and pipiens)*	0	0	0	0	0	0	0	0	0	0	0	108	0	**108**	**0.0**
Xenopus *(laevis and tropicalis)*	293	295	1,670	0	0	3	0	1,013	0	34	1,015	0	2,930	**7,253**	**0.7**
Other amphibian *(*other *Amphibia)*	0	0	0	0	0	1	0	0	0	0	0	521	0	**522**	**0.1**
Fish															
Zebrafish *(Danio rerio)*	18,211	7,514	75,906	0	83	5,664	4,943	17	3,486	115	17,524	6,436	13,341	**153,240**	**14.7**
Other fish (other *Pisces*)	0	140	158	0	90	0	6,734	0	21	220	1,272	50,871	1,012	**60,518**	**5.8**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**127,223**	**67,482**	**242,879**	**10,829**	**22,950**	**24,477**	**207,800**	**28,064**	**16,365**	**24,790**	**79,966**	**64,252**	**126,577**	**1,043,654**	**100.0**
% of total	**12.2**	**6.5**	**23.3**	**1.0**	**2.2**	**2.3**	**19.9**	**2.7**	**1.6**	**2.4**	**7.7**	**6.2**	**12.1**	**100.0**	

1. This category can include studies relating to dentistry.

Table 6 Experimental procedures (non-regulatory) by species of animal: translational/applied research , page 1 of 2

Great Britain 2017

Species of animal	Translational/applied research								
	Human Cancer	Human Infectious Disorders	Human Cardiovascular Disorders	Human Nervous and Mental Disorders	Human Respiratory Disorders	Human Gastrointestinal Disorders including Liver	Human Musculoskeletal Disorders[1]	Human Immune Disorders	Human Urogenital/ Reproductive Disorders
Mammal									
Mouse *(Mus musculus)*	84,898	34,971	3,070	20,137	6,024	3,464	3,651	5,252	2,738
Rat *(Rattus norvegicus)*	788	593	779	13,341	4,577	359	461	997	145
Guinea-pig *(Cavia porcellus)*	0	521	0	0	710	0	0	0	0
Hamster (Syrian) (*Mesocricetus auratus*)	0	536	0	0	0	0	0	0	0
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	0	0
Mongolian Gerbil *(Meriones unguiculatus)*	0	37	0	0	0	0	0	0	0
Other rodent *(*other *Rodentia)*	0	158	0	0	0	0	0	0	0
Rabbit *(Oryctolagus cuniculus)*	0	191	10	82	24	6	58	0	0
Cat *(Felis catus)*	0	0	0	0	0	0	0	0	0
Beagle *(Canis lupus familiaris)*	0	0	0	0	1	0	21	4	0
Other dog (other *Canis*)	0	0	0	0	0	0	0	0	0
Ferret *(Mustela putorius furo)*	0	297	0	0	0	0	0	0	0
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	0	0
Horse and other equid *(Equidae)*	0	0	0	0	0	0	0	0	0
Pig *(Sus scrofa domesticus)*	6	11	240	173	69	52	12	12	39
Goat *(Capra aegagrus hircus)*	0	0	0	0	0	0	0	0	0
Sheep *(Ovis aries)*	1	13	4	14	0	0	225	0	118
Cattle *(Bos primigenius)*	0	0	0	0	0	6	0	0	0
Primate									
New World monkey									
Marmoset and tamarin	0	87	0	35	0	0	0	0	0
Old World monkey									
Cynomolgus monkey (*Macaca fascicularis*)	0	54	0	0	0	0	0	0	0
Rhesus monkey (*Macaca mulatta*)	0	50	0	1	0	0	0	0	0
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	2	0
Bird									
Domestic fowl (*Gallus domesticus*)	33	0	0	0	0	0	0	0	0
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	0	0	0
Other bird (other *Aves*)	0	60	0	0	0	0	0	0	0
Reptile *(Reptilia)*	0	0	0	0	0	0	0	0	0
Amphibian									
Rana *(temporaria and pipiens)*	0	0	0	0	0	0	0	0	0
Xenopus *(laevis and tropicalis)*	185	0	0	0	0	0	0	0	0
Other amphibian *(*other *Amphibia)*	0	0	0	0	0	0	0	0	0
Fish									
Zebrafish *(Danio rerio)*	0	31,894	0	8,206	0	0	1,530	0	0
Other fish (other *Pisces*)	0	0	0	0	0	0	0	0	0
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	0	0
Total	**85,911**	**69,473**	**4,103**	**41,989**	**11,405**	**3,887**	**5,958**	**6,267**	**3,040**
% of total	**26.6**	**21.5**	**1.3**	**13.0**	**3.5**	**1.2**	**1.8**	**1.9**	**0.9**

Table 6 Experimental procedures (non-regulatory) by species of animal: Translational/applied research , page 2 of 2

Great Britain 2017

Species of animal	Translational/applied research								Total	% of total
	Human Sensory Organ Disorders (skin, eyes and ears)	Human Endocrine/ Metabolism Disorders	Other Human Disorders	Animal Diseases and Disorders	Animal Welfare	Diagnosis of diseases	Plant diseases	Non-regulatory toxicology and ecotoxicology		
Mammal										
Mouse *(Mus musculus)*	8,287	4,015	4,393	1,234	78	2,286	0	6,278	**190,776**	**59.2**
Rat *(Rattus norvegicus)*	449	3,790	6,217	193	22	206	0	6,724	**39,641**	**12.3**
Guinea-pig *(Cavia porcellus)*	0	0	92	20	0	70	0	101	**1,514**	**0.5**
Hamster (Syrian) (*Mesocricetus auratus*)	0	0	0	0	0	0	0	0	**536**	**0.2**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	0	0	0	0	0	0	0	0	**37**	**0.0**
Other rodent *(*other *Rodentia)*	0	0	0	0	0	0	0	0	**158**	**0.0**
Rabbit *(Oryctolagus cuniculus)*	77	0	0	128	0	202	0	4	**782**	**0.2**
Cat *(Felis catus)*	0	0	0	21	0	0	0	0	**21**	**0.0**
Beagle *(Canis lupus familiaris)*	0	0	0	0	0	0	0	667	**693**	**0.2**
Other dog (other *Canis*)	0	0	0	32	13	0	0	0	**45**	**0.0**
Ferret *(Mustela putorius furo)*	0	0	0	2	0	5	0	0	**304**	**0.1**
Other carnivore (other *Carnivora*)	0	0	0	99	0	0	0	0	**99**	**0.0**
Horse and other equid *(Equidae)*	0	0	0	66	20	0	0	0	**86**	**0.0**
Pig *(Sus scrofa domesticus)*	24	4	51	420	818	0	0	159	**2,090**	**0.6**
Goat *(Capra aegagrus hircus)*	0	0	0	0	108	0	0	0	**108**	**0.0**
Sheep *(Ovis aries)*	0	6	0	990	89	272	0	33	**1,765**	**0.5**
Cattle *(Bos primigenius)*	0	0	0	287	273	17	0	0	**583**	**0.2**
Primate										
New World monkey										
Marmoset and tamarin	0	0	0	0	0	0	0	0	**122**	**0.0**
Old World monkey										
Cynomolgus monkey (*Macaca fascicularis*)	0	0	0	0	0	0	0	177	**231**	**0.1**
Rhesus monkey (*Macaca mulatta*)	0	0	0	0	0	0	0	0	**51**	**0.0**
Other mammal (other *Mammalia*)	0	0	0	0	0	18	0	0	**20**	**0.0**
Bird										
Domestic fowl (*Gallus domesticus*)	0	0	0	9,948	336	225	0	0	**10,542**	**3.3**
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	0	0	**0**	**0.0**
Other bird (other *Aves*)	0	0	0	198	120	85	0	6	**469**	**0.1**
Reptile *(Reptilia)*	0	0	0	0	0	0	0	0	**0**	**0.0**
Amphibian										
Rana *(temporaria and pipiens)*	0	0	0	0	0	0	0	0	**0**	**0.0**
Xenopus *(laevis and tropicalis)*	0	0	0	0	0	0	0	0	**185**	**0.1**
Other amphibian *(*other *Amphibia)*	0	0	0	0	0	0	0	0	**0**	**0.0**
Fish										
Zebrafish *(Danio rerio)*	1,358	0	2	0	0	0	0	19,996	**62,986**	**19.5**
Other fish (other *Pisces*)	0	0	0	7,738	0	0	0	804	**8,542**	**2.6**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**10,195**	**7,815**	**10,755**	**21,376**	**1,877**	**3,386**	**0**	**34,949**	**322,386**	**100.0**
% of total	**3.2**	**2.4**	**3.3**	**6.6**	**0.6**	**1.1**	**0.0**	**10.8**	**100.0**	

1. This category can include studies relating to dentistry.

Table 7.1 Experimental procedures by species of animal: regulatory use

Great Britain 2017

Species of animal	Routine Production			Quality control				Other efficacy and tolerance testing	Toxicity and other safety testing including pharmacology	Total	% of total
	Blood based products	Monoclonal antibody production (ascites)	Other	Batch safety testing	Pyrogenicity testing	Batch potency testing	Other quality controls				
Mammal											
Mouse *(Mus musculus)*	184	0	0	17,196	0	104,333	10,448	**1,214**	**30,255**	**163,630**	**32.4**
Rat *(Rattus norvegicus)*	846	0	0	20	0	0	6	**1,965**	**141,899**	**144,736**	**28.7**
Guinea-pig *(Cavia porcellus)*	0	0	0	674	0	2,806	524	**0**	**509**	**4,513**	**0.9**
Hamster (Syrian) (*Mesocricetus auratus*)	0	0	0	20	0	0	445	**23**	**0**	**488**	**0.1**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Other rodent *(other Rodentia)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Rabbit *(Oryctolagus cuniculus)*	194	0	395	55	1,125	1,413	0	**133**	**4,492**	**7,807**	**1.5**
Cat *(Felis catus)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Beagle *(Canis lupus familiaris)*	170	0	0	0	0	0	0	**182**	**2,245**	**2,597**	**0.5**
Other dog (other *Canis*)	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Ferret *(Mustela putorius furo)*	6	0	0	0	0	0	0	**0**	**0**	**6**	**0.0**
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Horse and other equid *(Equidae)*	9,494	0	0	0	0	0	0	**132**	**0**	**9,626**	**1.9**
Pig *(Sus scrofa domesticus)*	0	0	0	46	0	150	0	**620**	**954**	**1,770**	**0.4**
Goat *(Capra aegagrus hircus)*	15	0	0	0	0	0	0	**0**	**25**	**40**	**0.0**
Sheep *(Ovis aries)*	42,137	0	0	2	0	84	0	**3**	**26**	**42,252**	**8.4**
Cattle *(Bos primigenius)*	0	0	0	18	0	436	0	**478**	**84**	**1,016**	**0.2**
Primate											
New World monkey											
Marmoset and tamarin	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Old World monkey											
Cynomolgus monkey (*Macaca fascicularis*)	226	0	0	0	0	0	0	**92**	**2,095**	**2,413**	**0.5**
Rhesus monkey (*Macaca mulatta*)	0	0	0	0	0	0	0	**0**	**3**	**3**	**0.0**
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Bird											
Domestic fowl (*Gallus domesticus*)	1,881	0	84,132	370	0	3,075	13	**19,140**	**1,267**	**109,878**	**21.8**
Quail *(Coturnix coturnix)*	0	0	0	0	0	0	0	**0**	**20**	**20**	**0.0**
Other bird (other *Aves*)	0	0	0	0	0	0	0	**624**	**172**	**796**	**0.2**
Reptile *(Reptilia)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Amphibian											
Rana *(temporaria and pipiens)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Xenopus *(laevis and tropicalis)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Other amphibian *(other Amphibia)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Fish											
Zebrafish *(Danio rerio)*	0	0	0	0	0	0	0	**0**	**447**	**447**	**0.1**
Other fish (other *Pisces*)	0	0	0	0	0	1,854	0	**0**	**11,189**	**13,043**	**2.6**
Cephalopod *(Cephalopoda)*	0	0	0	0	0	0	0	**0**	**0**	**0**	**0.0**
Total	**55,153**	**0**	**84,527**	**18,401**	**1,125**	**114,151**	**11,436**	**24,606**	**195,682**	**505,081**	**100.0**
% of total	**10.9**	**0.0**	**16.7**	**3.6**	**0.2**	**22.6**	**2.3**	**4.9**	**38.7**	**100.0**	

Table 7.2 Experimental procedures by species of animal: regulatory use by legislative requirement

Great Britain 2017

Species of animal	Testing by legislation										Total	% of total
	Legislation on medicinal products for human use	Legislation on medicinal products for veterinary use and their residues	Medical devices legislation	Industrial chemicals legislation	Plant protection product legislation	Biocides legislation	Food legislation including food contact material	Feed legislation including legislation for the safety of target animals, workers and environment	Cosmetics legislation	Other		
Mammal												
Mouse (*Mus musculus*)	144,420	12,742	401	2,885	2,831	50	27	0	0	274	**163,630**	**32.4**
Rat (*Rattus norvegicus*)	47,856	709	21	78,596	12,869	76	1,551	2,786	0	272	**144,736**	**28.7**
All other rodent[1]	3,409	1,564	28	0	0	0	0	0	0	0	**5,001**	**1.0**
Rabbit (*Oryctolagus cuniculus*)	3,924	1,585	690	241	351	166	0	0	0	850	**7,807**	**1.5**
Cat (*Felis catus*)	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Dog	2,291	104	0	0	32	0	0	0	0	170	**2,597**	**0.5**
Ferret (*Mustela putorius furo*)	0	0	0	0	0	0	0	0	0	6	**6**	**0.0**
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Horse and other equid (*Equidae*)	0	132	1,455	0	0	0	0	0	0	8,039	**9,626**	**1.9**
Pig (*Sus scrofa domesticus)*	725	920	0	0	0	0	0	125	0	0	**1,770**	**0.4**
Other ungulate[2]	26	1,079	4,690	0	51	0	0	0	0	37,462	**43,308**	**8.6**
Primate												
New World monkey	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Old World monkey	2,412	0	0	0	0	0	0	0	0	4	**2,416**	**0.5**
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Bird	25	96,696	0	10	349	0	0	11,713	0	1,901	**110,694**	**21.9**
Reptile, amphibian	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Fish	3,850	2,614	0	4,605	1,934	0	0	207	0	280	**13,490**	**2.7**
Cephalopod	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**208,938**	**118,145**	**7,285**	**86,337**	**18,417**	**292**	**1,578**	**14,831**	**0**	**49,258**	**505,081**	**100.0**
% of total	**41.4**	**23.4**	**1.4**	**17.1**	**3.6**	**0.1**	**0.3**	**2.9**	**0.0**	**9.8**	**100.0**	

1. "All other rodent" includes guinea pig (*Cavia porcellus*), Syrian hamster (*Mesocricetus auratus*), Chinese hamster (*Cricetulus griseus*), Mongolian gerbil (*Meriones unguiculatus*), and other rodents (other *Rodentia*).
2. "Other ungulate" includes goat (Capra aegagrus hircus), sheep (Ovis aries), and cattle (Bos primigenius).

Table 7.3 Experimental procedures by species of animal: regulatory use by origin of legislative requirement

Great Britain 2017

Species of animal	Legislative requirement			Total	% of total
	Legislation satisfying EU requirements	Legislation satisfying only UK requirements	Legislation satisfying Non-EU requirements only		
Mammal					
Mouse *(Mus musculus)*	142,267	130	21,233	**163,630**	**32.4**
Rat *(Rattus norvegicus)*	144,430	130	176	**144,736**	**28.7**
Guinea-pig *(Cavia porcellus)*	2,622	1,230	661	**4,513**	**0.9**
Hamster (Syrian) (*Mesocricetus auratus*)	43	0	445	**488**	**0.1**
Hamster (Chinese) (*Cricetulus griseus*)	0	0	0	**0**	**0.0**
Mongolian Gerbil *(Meriones unguiculatus)*	0	0	0	**0**	**0.0**
Other rodent *(*other *Rodentia)*	0	0	0	**0**	**0.0**
Rabbit *(Oryctolagus cuniculus)*	7,216	30	561	**7,807**	**1.5**
Cat *(Felis catus)*	0	0	0	**0**	**0.0**
Beagle *(Canis lupus familiaris)*	2,597	0	0	**2,597**	**0.5**
Other dog (other *Canis*)	0	0	0	**0**	**0.0**
Ferret *(Mustela putorius furo)*	6	0	0	**6**	**0.0**
Other carnivore (other *Carnivora*)	0	0	0	**0**	**0.0**
Horse and other equid *(Equidae)*	9,626	0	0	**9,626**	**1.9**
Pig *(Sus scrofa domesticus)*	1,770	0	0	**1,770**	**0.4**
Goat *(Capra aegagrus hircus)*	25	15	0	**40**	**0.0**
Sheep *(Ovis aries)*	42,248	4	0	**42,252**	**8.4**
Cattle *(Bos primigenius)*	1,016	0	0	**1,016**	**0.2**
Primate					
New World monkey					
Marmoset and tamarin	0	0	0	**0**	**0.0**
Old World monkey					
Cynomolgus monkey (*Macaca fascicularis*)	2,281	131	1	**2,413**	**0.5**
Rhesus monkey (*Macaca mulatta*)	3	0	0	**3**	**0.0**
Other mammal (other *Mammalia*)	0	0	0	**0**	**0.0**
Bird					
Domestic fowl (*Gallus domesticus*)	108,677	0	1,201	**109,878**	**21.8**
Quail *(Coturnix coturnix)*	20	0	0	**20**	**0.0**
Other bird (other *Aves*)	796	0	0	**796**	**0.2**
Reptile *(Reptilia)*	0	0	0	**0**	**0.0**
Amphibian					
Rana *(temporaria and pipiens)*	0	0	0	**0**	**0.0**
Xenopus *(laevis and tropicalis)*	0	0	0	**0**	**0.0**
Other amphibian *(*other *Amphibia)*	0	0	0	**0**	**0.0**
Fish					
Zebrafish *(Danio rerio)*	447	0	0	**447**	**0.1**
Other fish (other *Pisces*)	11,884	0	1,159	**13,043**	**2.6**
Cephalopod *(Cephalopoda)*	0	0	0	**0**	**0.0**
Total	**477,974**	**1,670**	**25,437**	**505,081**	**100.0**
% of total	**94.6**	**0.3**	**5.0**	**100.0**	

Table 7.4 Experimental procedures by species of animal: regulatory use by type of test - toxicity and other safety testing including pharmacology, page 1 of 2

Great Britain 2017

Species of animal	Acute and sub-acute toxicity testing methods			Other type of regulatory test or procedure									
	LD50 and LC50	Other lethal methods	Non-lethal methods	Skin irritation/corrosion	Skin sensitisation	Eye irritation/corrosion	Repeated dose toxicity	Carcinogenicity	Genotoxicity	Reproductive toxicity	Developmental toxicity	Safety testing in food and feed area	Target animal safety
Mammal													
Mouse (*Mus musculus*)	9,516	0	736	0	2,937	0	6,090	3,596	1,903	1,618	974	0	0
Rat (*Rattus norvegicus*)	1,022	98	4,381	0	0	0	30,220	4,471	3,411	58,541	31,325	0	0
All other rodent[1]	0	0	449	0	5	0	0	0	0	0	0	0	0
Rabbit (*Oryctolagus cuniculus*)	0	0	38	112	0	63	163	0	0	1,082	2,040	0	0
Cat (*Felis catus*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	108	0	0	0	1,775	0	0	0	0	0	0
Ferret (*Mustela putorius furo*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Horse and other equid (*Equidae*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pig (*Sus scrofa domesticus*)	0	0	12	0	0	0	597	0	0	0	0	0	190
Other ungulate[2]	0	0	0	0	0	0	0	0	0	0	0	4	4
Primate													
New World monkey	0	0	0	0	0	0	0	0	0	0	0	0	0
Old World monkey	0	0	136	0	0	0	1,584	0	0	0	0	0	0
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	0	0	0	0	0	0
Bird	42	0	0	0	0	0	0	0	0	0	0	30	942
Reptile, amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish	42	0	0	0	0	0	0	0	0	0	440	0	224
Cephalopod	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**10,622**	**98**	**5,860**	**112**	**2,942**	**63**	**40,429**	**8,067**	**5,314**	**61,241**	**34,779**	**34**	**1,360**
% of total	**5.4**	**0.1**	**3.0**	**0.1**	**1.5**	**0.0**	**20.7**	**4.1**	**2.7**	**31.3**	**17.8**	**0.0**	**0.7**

Table 7.4 Experimental procedures by species of animal: regulatory use by type of test - toxicity and other safety testing including pharmacology, page 2 of 2

Great Britain 2017

Species of animal	Other type of regulatory test or procedure				Ecotoxicity						Other type of toxicity or safety test	Total	% of total
	Neurotoxicity	Kinetics	Pharmo-dynamics	Phototoxicity	Acute toxicity	Chronic toxicity	Reproductive toxicity	Endocrine activity	Bioaccumulation	Other			
Mammal													
Mouse (*Mus musculus*)	0	455	723	0	0	0	0	0	0	0	1,707	**30,255**	**15.5**
Rat (*Rattus norvegicus*)	314	1,948	3,887	0	0	0	514	0	0	0	1,767	**141,899**	**72.5**
All other rodent[1]	0	0	55	0	0	0	0	0	0	0	0	**509**	**0.3**
Rabbit (*Oryctolagus cuniculus*)	0	18	91	0	0	0	0	0	0	0	885	**4,492**	**2.3**
Cat (*Felis catus*)	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Dog	0	16	248	0	0	0	0	0	0	0	98	**2,245**	**1.1**
Ferret (*Mustela putorius furo*)	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Other carnivore (other *Carnivora*)	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Horse and other equid (*Equidae*)	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Pig (*Sus scrofa domesticus)*	0	36	38	0	0	0	0	0	0	0	81	**954**	**0.5**
Other ungulate[2]	0	115	0	0	0	0	0	0	0	0	12	**135**	**0.1**
Primate													
New World monkey	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Old World monkey	0	192	64	0	0	0	0	0	0	0	122	**2,098**	**1.1**
Other mammal (other *Mammalia*)	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Bird	0	317	0	0	0	0	0	0	0	0	128	**1,459**	**0.7**
Reptile, amphibian	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Fish	0	0	0	0	3,653	6,320	0	84	873	0	0	**11,636**	**5.9**
Cephalopod	0	0	0	0	0	0	0	0	0	0	0	**0**	**0.0**
Total	**314**	**3,097**	**5,106**	**0**	**3,653**	**6,320**	**514**	**84**	**873**	**0**	**4,800**	**195,682**	**100.0**
% of total	**0.2**	**1.6**	**2.6**	**0.0**	**1.9**	**3.2**	**0.3**	**0.0**	**0.4**	**0.0**	**2.5**	**100.0**	

1. "All other rodent" includes guinea pig (*Cavia porcellus*), Syrian hamster (*Mesocricetus auratus*), Chinese hamster (*Cricetulus griseus*), Mongolian gerbil (*Meriones unguiculatus*), and other rodents (other *Rodentia*).
2. "Other ungulate" includes goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and cattle (*Bos primigenius*).

Table 8 Creation of new lines and maintenance of established lines of genetically altered animals (not used in experimental procedures) by species of animal, severity and genetic status

Great Britain 2017

Species of animal[1]	Actual severity	Genetic status			Total	% of species total
		Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mouse (*Mus musculus*)	Sub threshold	26,897	1,038,272	207,084	1,272,253	75.4
	Non - recovery	153	252	38	443	0.0
	Mild	43,104	246,315	36,039	325,458	19.3
	Moderate	12,284	21,371	13,893	47,548	2.8
	Severe	142	22,554	18,420	41,116	2.4
	Total	**82,580**	**1,328,764**	**275,474**	**1,686,818**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	44	4,051	732	4,827	61.3
	Non - recovery	0	0	0	0	0.0
	Mild	45	394	1,212	1,651	21.0
	Moderate	455	6	645	1,106	14.1
	Severe	0	14	270	284	3.6
	Total	**544**	**4,465**	**2,859**	**7,868**	**100.0**
Pig (*Sus scrofa domesticus*)	Sub threshold	0	85	0	85	65.4
	Non - recovery	0	0	0	0	0.0
	Mild	0	45	0	45	34.6
	Moderate	0	0	0	0	0.0
	Severe	0	0	0	0	0.0
	Total	**0**	**130**	**0**	**130**	**100.0**
Other ungulate[2]	Sub threshold	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0.0
	Mild	0	14	0	14	82.4
	Moderate	0	0	3	3	17.6
	Severe	0	0	0	0	0.0
	Total	**0**	**14**	**3**	**17**	**100.0**
Bird	Sub threshold	0	860	0	860	55.8
	Non - recovery	0	0	0	0	0.0
	Mild	47	534	0	581	37.7
	Moderate	0	0	93	93	6.0
	Severe	0	0	6	6	0.4
	Total	**47**	**1,394**	**99**	**1,540**	**100.0**
Amphibian	Sub threshold	40	666	0	706	52.4
	Non - recovery	0	0	0	0	0.0
	Mild	164	476	0	640	47.5
	Moderate	0	0	0	0	0.0
	Severe	1	1	0	2	0.1
	Total	**205**	**1,143**	**0**	**1,348**	**100.0**
Fish	Sub threshold	4,421	115,578	3,429	123,428	60.0
	Non - recovery	26	4	0	30	0.0
	Mild	3,902	70,057	1,473	75,432	36.7
	Moderate	24	5,434	205	5,663	2.8
	Severe	4	823	339	1,166	0.6
	Total	**8,377**	**191,896**	**5,446**	**205,719**	**100.0**
All species	Sub threshold	31,402	1,159,512	211,245	1,402,159	73.7
	Non - recovery	179	256	38	473	0.0
	Mild	47,262	317,835	38,724	403,821	21.2
	Moderate	12,763	26,811	14,839	54,413	2.9
	Severe	147	23,392	19,035	42,574	2.2
	Total	**91,753**	**1,527,806**	**283,881**	**1,903,440**	**100.0**

1. Some species were not displayed on this table as they were not used in relevant procedures in 2017.
2. "Other ungulate" includes goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and cattle (*Bos primigenius*).

Table 9.1 Creation of new lines of genetically altered animals (not used in experimental procedures) by species of animal, severity and genetic status

Great Britain 2017

Species of animal[1]	Actual severity	Basic research by genetic status			Translational/applied research by genetic status			Total by genetic status			Total	% of species total
		Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype	Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype	Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mouse (*Mus musculus*)	Sub threshold	18,525	111,549	7,492	0	5,095	0	18,525	116,644	7,492	142,661	66.7
	Non - recovery	106	69	23	0	0	0	106	69	23	198	0.1
	Mild	25,745	20,252	4,535	129	542	0	25,874	20,794	4,535	51,203	23.9
	Moderate	8,600	5,232	3,053	1,097	510	0	9,697	5,742	3,053	18,492	8.6
	Severe	39	719	636	0	0	0	39	719	636	1,394	0.7
	Total	**53,015**	**137,821**	**15,739**	**1,226**	**6,147**	**0**	**54,241**	**143,968**	**15,739**	**213,948**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	2	7	0	0	0	0	2	7	0	9	6.9
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	30	28	0	30	28	0	58	44.3
	Moderate	46	0	0	18	0	0	64	0	0	64	48.9
	Severe	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**48**	**7**	**0**	**48**	**28**	**0**	**96**	**35**	**0**	**131**	**100.0**
Pig (*Sus scrofa domesticus*)	Sub threshold	0	79	0	0	0	0	0	79	0	79	63.7
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	45	0	0	0	0	0	45	0	45	36.3
	Moderate	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**124**	**0**	**0**	**0**	**0**	**0**	**124**	**0**	**124**	**100.0**
Other ungulate[2]	Sub threshold	0	0	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	14	0	0	0	0	0	14	0	14	82.4
	Moderate	0	0	3	0	0	0	0	0	3	3	17.6
	Severe	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**14**	**3**	**0**	**0**	**0**	**0**	**14**	**3**	**17**	**100.0**
Bird	Sub threshold	0	327	0	0	7	0	0	334	0	334	51.6
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	21	272	0	0	20	0	21	292	0	313	48.4
	Moderate	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**21**	**599**	**0**	**0**	**27**	**0**	**21**	**626**	**0**	**647**	**100.0**
Amphibian	Sub threshold	0	0	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	150	100	0	0	0	0	150	100	0	250	100.0
	Moderate	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**150**	**100**	**0**	**0**	**0**	**0**	**150**	**100**	**0**	**250**	**100.0**
Fish	Sub threshold	2,330	18,489	71	0	413	0	2,330	18,902	71	21,303	42.6
	Non - recovery	0	3	0	0	0	0	0	3	0	3	0.0
	Mild	80	23,076	1,004	0	1,114	0	80	24,190	1,004	25,274	50.5
	Moderate	22	2,876	181	0	0	0	22	2,876	181	3,079	6.2
	Severe	0	186	212	0	0	0	0	186	212	398	0.8
	Total	**2,432**	**44,630**	**1,468**	**0**	**1,527**	**0**	**2,432**	**46,157**	**1,468**	**50,057**	**100.0**
All species	Sub threshold	20,857	130,451	7,563	0	5,515	0	20,857	135,966	7,563	164,386	62.0
	Non - recovery	106	72	23	0	0	0	106	72	23	201	0.1
	Mild	25,996	43,759	5,539	159	1,704	0	26,155	45,463	5,539	77,157	29.1
	Moderate	8,668	8,108	3,237	1,115	510	0	9,783	8,618	3,237	21,638	8.2
	Severe	39	905	848	0	0	0	39	905	848	1,792	0.7
	Total	**55,666**	**183,295**	**17,210**	**1,274**	**7,729**	**0**	**56,940**	**191,024**	**17,210**	**265,174**	**100.0**

1. Some species were not displayed on this table as they were not used in relevant procedures in 2017.
2. "Other ungulate" includes goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and cattle (*Bos primigenius*).

Table 9.2 Creation of new lines of genetically altered animals (not used in experimental procedures) by species of animal and severity: basic research

Great Britain 2017

Species of animal[1]	Actual severity	Basic Research													Total	% of species total
		Oncology	Cardiovascular Blood and Lymphatic System	Nervous System	Respiratory System	Gastrointestinal System including Liver	Musculoskeletal System[2]	Immune System	Urogenital/ Reproductive System	Sensory Organs (skin, eyes and ears)	Endocrine System/ Metabolism	Multisystemic	Ethology / Animal Behaviour /Animal Biology	Other		
Mouse (*Mus musculus*)	Sub threshold	31,573	3,389	9,329	130	2,216	690	19,371	4,028	3,169	2,488	57,404	18	3,761	137,566	66.6
	Non - recovery	0	0	51	0	0	0	0	0	0	0	147	0	0	198	0.1
	Mild	6,771	1,416	2,752	497	631	650	7,711	1,816	1,119	513	20,469	18	6,169	50,532	24.5
	Moderate	3,254	526	865	27	265	302	1,981	771	201	409	5,756	1	2,527	16,885	8.2
	Severe	246	67	146	4	14	5	160	3	9	11	527	0	202	1,394	0.7
	Total	**41,844**	**5,398**	**13,143**	**658**	**3,126**	**1,647**	**29,223**	**6,618**	**4,498**	**3,421**	**84,303**	**37**	**12,659**	**206,575**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	0	0	4	0	0	0	0	0	0	0	5	0	0	9	16.4
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Moderate	0	0	0	0	0	0	0	0	0	0	16	0	30	46	83.6
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**	**0**	**30**	**55**	**100.0**
Pig (*Sus scrofa domesticus*)	Sub threshold	0	0	0	0	0	0	48	0	0	0	31	0	0	79	63.7
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	2	4	0	0	0	31	0	0	0	8	0	0	45	36.3
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**2**	**4**	**0**	**0**	**0**	**79**	**0**	**0**	**0**	**39**	**0**	**0**	**124**	**100.0**
Other ungulate[3]	Sub threshold	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	13	1	0	0	0	0	0	0	0	0	0	14	82.4
	Moderate	0	0	3	0	0	0	0	0	0	0	0	0	0	3	17.6
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**16**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17**	**100.0**
Bird	Sub threshold	0	0	0	0	0	0	0	42	0	0	285	0	0	327	52.7
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	0	0	0	0	83	0	0	210	0	0	293	47.3
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**125**	**0**	**0**	**495**	**0**	**0**	**620**	**100.0**
Amphibian	Sub threshold	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	0	0	0	0	0	0	0	0	0	250	250	100.0
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**250**	**250**	**100.0**
Fish	Sub threshold	929	2,704	8,665	0	0	1,266	1,887	0	73	0	1,120	2,028	2,218	20,890	43.0
	Non - recovery	0	0	2	0	0	1	0	0	0	0	0	0	0	3	0.0
	Mild	804	2,024	7,341	0	109	968	1,099	31	971	0	6,751	777	3,285	24,160	49.8
	Moderate	1,717	449	32	0	0	15	22	0	0	0	89	8	747	3,079	6.3
	Severe	75	44	213	0	0	49	1	0	0	0	0	4	12	398	0.8
	Total	**3,525**	**5,221**	**16,253**	**0**	**109**	**2,299**	**3,009**	**31**	**1,044**	**0**	**7,960**	**2,817**	**6,262**	**48,530**	**100.0**
All species	Sub threshold	32,502	6,093	17,998	130	2,216	1,956	21,306	4,070	3,242	2,488	58,845	2,046	5,979	158,871	62.0
	Non - recovery	0	0	53	0	0	1	0	0	0	0	147	0	0	201	0.1
	Mild	7,575	3,442	10,110	498	740	1,618	8,841	1,930	2,090	513	27,438	795	9,704	75,294	29.4
	Moderate	4,971	975	900	27	265	317	2,003	771	201	409	5,861	9	3,304	20,013	7.8
	Severe	321	111	359	4	14	54	161	3	9	11	527	4	214	1,792	0.7
	Total	**45,369**	**10,621**	**29,420**	**659**	**3,235**	**3,946**	**32,311**	**6,774**	**5,542**	**3,421**	**92,818**	**2,854**	**19,201**	**256,171**	**100.0**

1. Some species were not displayed on this table as they were not used in relevant procedures in 2017.
2. This category can include studies relating to dentistry.
3. "Other ungulate" includes goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and cattle (*Bos primigenius*).

Table 9.3 Creation of new lines of genetically altered animals (not used in experimental procedures) by species of animal and severity: translational/applied research

Great Britain 2017

Species of animal[1]	Actual severity	Translational/applied research																Total	% of species total
		Human Cancer	Human Infectious Disorders	Human Cardiovascular Disorders	Human Nervous and Mental Disorders	Human Respiratory Disorders	Human Gastrointestinal Disorders including Liver	Human Musculoskeletal Disorders[2]	Human Immune Disorders	Human Urogenital/ Reproductive Disorders	Human Sensory Organ Disorders (skin, eyes and ears)	Human Endocrine/ Metabolism Disorders	Other Human Disorders	Animal Diseases and Disorders	Animal Welfare	Diagnosis of diseases	Plant diseases	Non-regulatory toxicology and ecotoxicology		
Mouse (*Mus musculus*)	Sub threshold	2,392	0	0	14	0	0	0	805	320	0	0	8	1,556	0	0	0	0	5,095	69.1
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	438	0	123	42	0	0	0	68	0	0	0	0	0	0	0	0	0	671	9.1
	Moderate	1,391	0	30	23	0	0	0	0	160	0	0	0	3	0	0	0	0	1,607	21.8
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**4,221**	**0**	**153**	**79**	**0**	**0**	**0**	**873**	**480**	**0**	**0**	**8**	**1,559**	**0**	**0**	**0**	**0**	**7,373**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	30	28	0	0	0	0	0	0	0	0	0	0	0	0	0	58	76.3
	Moderate	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	23.7
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**48**	**28**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**76**	**100.0**
Bird	Sub threshold	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	7	25.9
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	20	74.1
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**0**	**0**	**27**	**100.0**
Fish	Sub threshold	0	0	0	218	0	0	155	0	0	0	0	40	0	0	0	0	0	413	27.0
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	0	730	0	24	0	0	0	0	0	80	0	0	0	0	0	0	280	1,114	73.0
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**0**	**730**	**0**	**242**	**0**	**0**	**155**	**0**	**0**	**80**	**0**	**40**	**0**	**0**	**0**	**0**	**280**	**1,527**	**100.0**
All species	Sub threshold	2,392	0	0	232	0	0	155	805	320	0	0	48	1,563	0	0	0	0	5,515	61.3
	Non - recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Mild	438	730	153	94	0	0	0	68	0	80	0	0	20	0	0	0	280	1,863	20.7
	Moderate	1,391	0	48	23	0	0	0	0	160	0	0	0	3	0	0	0	0	1,625	18.0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Total	**4,221**	**730**	**201**	**349**	**0**	**0**	**155**	**873**	**480**	**80**	**0**	**48**	**1,586**	**0**	**0**	**0**	**280**	**9,003**	**100.0**

1. Some species were not displayed on this table as they were not used in relevant procedures in 2017.
2. This category can include studies relating to dentistry.

Table 10 Maintenance of established lines of genetically altered animals (not used in experimental procedures) by species of animal, severity and genetic status

Great Britain 2017

Species of animal[1]	Actual severity	Genetic status			Total	% of species total
		Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mouse (*Mus musculus*)	Sub threshold	8,372	921,628	199,592	1,129,592	76.7
	Non - recovery	47	183	15	245	0.0
	Mild	17,230	225,521	31,504	274,255	18.6
	Moderate	2,587	15,629	10,840	29,056	2.0
	Severe	103	21,835	17,784	39,722	2.7
	Total	**28,339**	**1,184,796**	**259,735**	**1,472,870**	**100.0**
Rat (*Rattus norvegicus*)	Sub threshold	42	4,044	732	4,818	62.3
	Non - recovery	0	0	0	0	0.0
	Mild	15	366	1,212	1,593	20.6
	Moderate	391	6	645	1,042	13.5
	Severe	0	14	270	284	3.7
	Total	**448**	**4,430**	**2,859**	**7,737**	**100.0**
Pig (*Sus scrofa domesticus*)	Sub threshold	0	6	0	6	100.0
	Non - recovery	0	0	0	0	0.0
	Mild	0	0	0	0	0.0
	Moderate	0	0	0	0	0.0
	Severe	0	0	0	0	0.0
	Total	**0**	**6**	**0**	**6**	**100.0**
Bird	Sub threshold	0	526	0	526	58.9
	Non - recovery	0	0	0	0	0.0
	Mild	26	242	0	268	30.0
	Moderate	0	0	93	93	10.4
	Severe	0	0	6	6	0.7
	Total	**26**	**768**	**99**	**893**	**100.0**
Amphibian	Sub threshold	40	666	0	706	64.3
	Non - recovery	0	0	0	0	0.0
	Mild	14	376	0	390	35.5
	Moderate	0	0	0	0	0.0
	Severe	1	1	0	2	0.2
	Total	**55**	**1,043**	**0**	**1,098**	**100.0**
Fish	Sub threshold	2,091	96,676	3,358	102,125	65.6
	Non - recovery	26	1	0	27	0.0
	Mild	3,822	45,867	469	50,158	32.2
	Moderate	2	2,558	24	2,584	1.7
	Severe	4	637	127	768	0.5
	Total	**5,945**	**145,739**	**3,978**	**155,662**	**100.0**
All species	Sub threshold	10,545	1,023,546	203,682	1,237,773	75.6
	Non - recovery	73	184	15	272	0.0
	Mild	21,107	272,372	33,185	326,664	19.9
	Moderate	2,980	18,193	11,602	32,775	2.0
	Severe	108	22,487	18,187	40,782	2.5
	Total	**34,813**	**1,336,782**	**266,671**	**1,638,266**	**100.0**

1. Some species were not displayed on this table as they were not used in relevant procedures in 2017.

Table 11 Procedures and project licences by type of licensed establishment

Great Britain 2017

Type of licensed establishment	Number of project licences where countable[1] procedures were completed in 2017 by number of procedures									Number of project licences where only non-countable[1] procedures were completed in 2017	Number of project licences where no procedures were completed in 2017	Total number of project licences	Number of procedures	
	Number of procedures								Total				Total	% of total
	1 to 50	51 to 100	101 to 200	201 to 400	401 to 600	601 to 800	801 to 1,000	More than 1,000						
Public health laboratories	10	6	10	6	5	0	1	5	43	0	11	54	**17,572**	**0.5**
Universities, medical schools	381	183	242	307	171	119	87	479	1,969	7	526	2,502	**1,898,055**	**50.1**
Government departments	16	9	8	7	3	3	1	22	69	1	25	95	**164,601**	**4.3**
Other public bodies	7	5	9	2	3	4	0	17	47	0	11	58	**147,465**	**3.9**
Non-profit-making organisations	35	13	24	22	6	11	10	100	221	2	35	258	**627,922**	**16.6**
Commercial organisations	32	9	20	18	14	11	14	60	178	0	44	222	**933,758**	**24.6**
Total	**481**	**225**	**313**	**362**	**202**	**148**	**113**	**683**	**2,527**	**10**	**652**	**3,189**	**3,789,373**	**100.0**

1. Procedures on adult or free-living animals (including neonatal and juvenile mammals, and newly hatched birds) are counted.
Details of procedures on immature forms (e.g. larvae, embryos, fish fry) are not counted unless they have reached the free-feeding stage (e.g. zebrafish fry from 5 days post-fertilisation and tadpoles).
Animals in the wild involved in rodenticide trials are also not counted. However, information is collected on the number of project licences which undertook rodenticide trials (3 returns in 2017).

Appendix A: Revisions

It is standard practice across all Home Office statistical releases to incorporate revisions to previous years' data in the latest release. Corrections and revisions follow the Home Office's statement of compliance with the Code of Practice for Official Statistics[7].

Quality assurance checks revealed a small number of misclassifications within the 2014, 2015 and 2016 datasets. The headline figures for 2014 remain unchanged (3.87 million), while there were small changes to the total number of procedures for 2015 (a decrease of 420 procedures, from a total of 4.14 million) and 2016 (a decrease of 210 procedures, from a total of 3.94 million). The revision table below details all revisions to the 2014, 2015 and 2016 data made since the 2016 release.

Revisions to 2014
The sub-purpose of 32,310 experimental procedures involving sheep, originally reported under as 'Routine production – other' (Regulatory), was revised to 'Routine production – blood products' (Regulatory)
The sub-purpose of 6,051 experimental procedures involving horses, originally reported under as 'Routine production – other' (Regulatory), was revised to 'Routine production – blood products' (Regulatory)
The purpose of 129 experimental procedures involving mice, originally reported under 'Multisystemic' (Basic research), was revised to 'Higher education or training'
The purpose of 87 experimental procedures involving rats, originally reported under 'Cardiovascular blood and lymphatic system' (Basic research), was revised to 'Higher education or training'
The purpose of 35 experimental procedures involving mice, originally reported under 'Nervous system' (Basic research), was revised to 'Higher education or training'
The purpose of 22 experimental procedures involving mice, originally reported under 'Respiratory system' (Basic research), was revised to 'Higher education or training'
The purpose of 11 experimental procedures involving guinea-pigs, originally reported under 'Respiratory system' (Basic research), was revised to 'Higher education or training'

Revisions to 2015
The sub-purpose of 38,520 experimental procedures involving sheep, originally reported under as 'Routine production – other' (Regulatory), was revised to 'Routine production – blood products' (Regulatory)
The sub-purpose of 7,656 experimental procedures involving horses, originally reported under as 'Routine production – other' (Regulatory), was revised to 'Routine production – blood products' (Regulatory)
400 experimental procedures (Regulatory) involving rats were removed
20 experimental procedures (Regulatory) involving mice were removed

[7] See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341674/ho-compliance-state-aug14.pdf (specifically, revisions and corrections section).

Revisions to 2015
The severity of 1 experimental procedure (Regulatory) involving a rabbit, originally reported as ‘Mild’, was revised to ‘Moderate’

Revisions to 2016
The sub-purpose of 35,744 experimental procedures involving sheep, originally reported under as ‘Routine production – other’ (Regulatory), was revised to ‘Routine production – blood products’ (Regulatory)
The sub-purpose of 6,334 experimental procedures involving horses, originally reported under as ‘Routine production – other’ (Regulatory), was revised to ‘Routine production – blood products’ (Regulatory)
The purpose of 5,930 experimental procedures involving sheep, originally reported under as ‘Protection of the environment’, was revised to ‘Routine production – blood products’ (Regulatory)
The purpose of 1,700 experimental procedures involving horses, originally reported under as ‘Protection of the environment’, was revised to ‘Routine production – blood products’ (Regulatory)
209 breeding procedures involving mice were removed
The purpose of 109 experimental procedures involving rats, originally reported under ‘Cardiovascular blood and lymphatic system’ (Basic research), was revised to ‘Higher education or training’
The genetic status of rats used in 106 breeding procedures, originally reported as ‘Not genetically altered’, was revised to ‘Genetically altered with a harmful phenotype’
The purpose of 54 experimental procedures involving mice, originally reported under ‘Cardiovascular blood and lymphatic system’ (Basic research), was revised to ‘Higher education or training’
The purpose of 30 experimental procedures involving mice, originally reported under ‘Nervous system’ (Basic research), was revised to ‘Higher education or training’
The purpose of 24 experimental procedures involving mice, originally reported under ‘Endocrine system/Metabolism’ (Basic research), was revised to ‘Higher education or training’
The purpose of 12 experimental procedures involving mice, originally reported under ‘Respiratory system’ (Basic research), was revised to ‘Higher education or training’
The genetic status of rats used in 11 experimental procedures, originally reported as ‘Not genetically altered’, was revised to ‘Genetically altered with a harmful phenotype’
The purpose of 8 experimental procedures involving guinea-pigs, originally reported under ‘Respiratory system’ (Basic research), was revised to ‘Higher education or training’
The place of birth of 8 mice, originally reported as re-used (so no place of birth given), was revised to ‘born in the UK at a licensed establishment’ (not re-used)
The severity of 1 breeding procedure (Regulatory) involving a mouse, originally reported as ‘Moderate’, was revised to ‘Sub-threshold’

Revisions to 2016
The severity of 1 breeding procedure (Regulatory) involving a mouse, originally reported as ‘Moderate’, was revised to ‘Non-recovery’

The published statistical reports and data tables for 2014, 2015 and 2016 have not been republished to reflect these revisions, as this was considered a disproportionate cost for such minor amendments.

CCS0218041702
978-1-5286-0226-6