



Home Office

Annual Statistics of Scientific Procedures on Living Animals Great Britain 2014



Annual Statistics of Scientific Procedures on Living Animals Great Britain 2014

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

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Introductory Notes

Animals (Scientific Procedures) Act 1986 and key definitions

In the UK the use of animals in scientific procedures is regulated by the Animals (Scientific Procedures) Act 1986¹, an animal protection measure that requires licensing and oversight of all places, projects and personnel involved in such work. The general system of control under the 1986 Act is explained in detail in the Appendix.

The purpose of this publication is to meet the requirements of the 1986 Act to collect and publish statistical information on the use of protected animals in regulated procedures during the previous calendar year and to lay that information before Parliament.² This release covers Great Britain whilst, for Northern Ireland, the Department of Health, Social Services and Public Safety separately collects and publishes information on regulated procedures under devolved arrangements.

Protected animals are defined in the 1986 Act³ as any living vertebrate other than man and any living cephalopod. Regulated procedures are defined in the 1986 Act as any procedure applied to a protected animal for an experimental or other scientific purpose, or for an educational purpose⁴, 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. As the 1986 Act indicates, the breeding of an animal⁵ is a regulated procedure if the animal is bred from, or is the descendant of, an animal whose genes have mutated or been modified. For simplicity, these procedures will be referred to from this point on as the creation/breeding of genetically altered animals.

The number of regulated procedures, which will be simply referred to as procedures from this point on, usually corresponds with the number of animals used⁶. However, animals are sometimes 're-used' when they have fully recovered from a previous procedure and in these instances they are counted as separate, additional, procedures. Overall, the number of procedures is always slightly higher than the number of animals used. The figures in this release focus on the number of procedures, not the number of animals, unless otherwise stated.

Changes to the data collection

Further to the above, the European Directive 2010/63/EU⁷ sets out a common format for member states, which includes the United Kingdom, and therefore Great Britain, to submit information on the use of animals for scientific purposes. Following the transposition of the directive into UK law in January 2013, through amendment regulations to the Animals

¹ The Animals (Scientific Procedures) Act 1986 can be accessed at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/308593/ConsolidatedA_SPA1Jan2013.pdf.

² Sections 21(7), 21A(1) and 21A(2).

³ Section 1(1). The remainder of section 1 provides greater detail on what protected animals cover.

⁴ Sections 2(1) and 2(1A). The remainder of section 2 provides greater detail on what regulated procedures cover.

⁵ Section 2(3B).

⁶ Specifically, the number of animals used for the first time in procedures. Information on the number of animals re-used is not collected.

⁷ See <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0063>.

(Scientific Procedures) Act 1986, some changes have been made to the collection which have impacted on the 2014 figures in this release. The key changes are listed as follows.

- In order to allow for the collection of data on actual severity of procedures (see below), these data are for procedures *completed*, as opposed to procedures *started*, as reported in previous publications. Any procedures started and counted in 2013 or earlier, but which were completed on or after 1 January 2014, should have been counted again for this statistical collection.
- Details of the actual severity⁸ are recorded for all procedures. This is an assessment of the severity that animals experienced as a result of the entire procedure applied and reflects the peak severity of that procedure.
- The species' information collected has been revised (these changes were also in place for the previous year's collection). Information on all cephalopods⁹ as opposed to only one species (*Octopus vulgaris*) are now collected as is information on species newly listed in 2013 in Schedule 2 of the Animal (Scientific Procedures) Act 1986. Data on greyhounds and beagles are no longer collected separately from other dogs. More detail is collected on primate species.
- For the first time, information on free-feeding larval forms (e.g. tadpoles) is now collected (but as in previous years unborn or un-hatched embryos are not counted). This has resulted in a large increase in the number of procedures involving amphibians.
- Precise information on the number of individual animals re-used is no longer collected. However, it is still possible to ascertain the number of procedures which involved the re-use of animals.
- Data are now collected on place of birth, which replaces source. Greater detail is collected on the place of birth of non-human primates. For the first time, information is collected on whether non-human primates were wild caught or captive bred. For captive bred non-human primates, information is also collected on the number of generations that they have been bred in captivity.
- For genetically altered animals, separate breakdowns on genetically modified animals and animals with a harmful genetic mutation are no longer collected. Instead, separate breakdowns are now collected on animals which show a harmful phenotype (i.e. a harmful physical or biochemical defect) and animals which do not show a harmful phenotype.
- Data are no longer collected on use of anaesthesia.
- Information on target body system is no longer collected for all procedures but similar data are collected for procedures undertaken for basic and translational research purposes.
- Specific information is now collected on regulatory use. Some of this information was previously reported as applied studies. Fundamental toxicological research, method development, and those safety-related procedures, for which there is no regulatory requirement, are now reported under translational/applied research.

⁸ The classification of severity followed the guidelines given in Annex 8 of European Directive 2010/63/EU, which the Home Office further interpreted in "Advisory notes on recording and reporting the actual severity of regulated procedures". See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/276014/NotesActualSeverityReporting.pdf.

⁹ Marine invertebrate animals such as an octopus or squid.

Data quality

As for any new collection, it is expected that there will be inconsistencies around the reporting of data until project licence holders (i.e. data suppliers) become familiar with the new reporting requirements and the revised data collection format. As a result, the 2014 data and comparisons with previous years' data should be interpreted with some caution.

Caveats are as follows.

- As a result of the change to counting procedures completed as opposed to procedures started, all procedures started before 2014 but completed in 2014 should be in both the pre-2014 and 2014 figures. Any procedures started in 2014 but completed after 2014 will not be included in the 2014 figures. It is expected that these opposing effects will partly cancel each other out. Any impact of the change from counting procedures started to counting procedures completed will be temporary and will disappear from future years' data collections.
- Quality assurance checks have identified that it is likely that some project licence holders have not reported this year on details of procedures started before 2014 but completed in 2014 which they previously reported on in earlier years. This has likely resulted in some under-reporting of the number of procedures.¹⁰ This will be a temporary effect reflecting the change in the reporting process and, if present, will disappear from future years' data collections.
- Similarly, quality assurance checks have identified that some project licence holders may have provided information on the number of animals (used in procedures) instead of on the number of procedures. Usually, one animal corresponds with one procedure and there will be no under-reporting of procedures in these instances. However, where more than one procedure is associated with the use of one animal, there may have been some under-reporting of the number of procedures. Where identified, this has been investigated and corrected.
- For the first time, information has been collected on the actual severity of the procedures. There may have been some inconsistency in the reporting of this data but it is expected that this will decrease in future years as project licence holders become familiar with the new reporting process.
- Quality assurance checks have identified that some project licence holders provided incorrect information on breakdowns for the breeding of genetically altered animals. Specifically, some information was provided under creation of a new genetic line when it should have been reported under maintenance of established lines of genetically altered animals. This issue will only have affected the categorisation of genetically altered animals created/bred and not any totals.

Further work will be undertaken in collaboration with project licence holders to identify issues and improve data capture. The Home Office will be enhancing the guidance notes and the format of the data collection template to improve the data provided for the 2015 collection.

Presentation

For the figures in this report, in some instances, there may appear to be small discrepancies between totals and the sums of related breakdowns but these will not be true discrepancies and will be attributable to rounding.

¹⁰ It is also likely that there has been some under-reporting in the number of animals used for the first time.

To simplify the presentation of figures relating to the numbers of procedures (or animals), all have been rounded depending on their size. However, all numeric changes across years, percentage changes across years, and percentages are based on unrounded data, which are available in the tables. The rounding conventions, which also ensure that a sufficient level of detail is still presented, are as follows.

- All figures in millions are presented as millions and rounded to two decimal places. For example, 2,121,582 would be presented as 2.12 million.
- All figures less than a million but greater than 10,000 are presented as whole numbers and rounded to the nearest thousand. For example, 343,465 would be presented as 343 thousand.
- All figures less than 10,000 but greater than 1,000 are presented as whole numbers to the nearest 100. For example, 8,465 would be presented as 8,500.
- All figures less than a thousand are presented as whole numbers and rounded to the nearest 10. For example, 49 would be presented as 50.
- All percentages greater than 1% are presented to the nearest per cent. All percentages less than 1% are rounded to the nearest 0.1%. For example, 1.43% would be presented as 1% and 0.43% would be presented as 0.4%.

Confidentiality

Detailed information on the work of individual project licence holders is not readily identifiable in this publication.

Revisions

No project licence holders made revisions to any of their data for previous years. The data for the latest year (and for other years) may be revised in due course particularly as the new data collection becomes more established. 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 Statistics¹¹.

Uses of the statistics

The statistics are used to inform the development of policies on animal use in scientific work, and provide information for the scientific community, animal welfare organisations and the general public.

Acknowledgements

Statisticians in the Chief Statistician's Unit, which is part of the Home Office Science Group, prepared this statistical release. They are grateful for the contribution of project licence holders who provided the returns on which this report is based.

¹¹ See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/341674/ho-compliance-state-aug14.pdf. Specifically, revisions and corrections section.

Further information available

This statistical release is available online at:

<https://www.gov.uk/government/publications/statistics-of-scientific-procedures-on-living-animals-great-britain-2014>. The website also includes:

- data tables which include the (unrounded) 2014 figures detailed in this report.
- an accompanying user guide for the statistics.

Forthcoming publications are pre-announced on the statistics release calendar on the Gov.uk website: <https://www.gov.uk/government/statistics/announcements>.

Feedback and enquiries

The Home Office is seeking feedback on this publication so that we can assess how well it meets our users' needs and make improvements where possible. If you have not already done so, please could you complete a short five-minute survey:

<http://www.homeofficesurveys.homeoffice.gov.uk/s/statistics-of-scientific-procedures-on-living-animals/>.

If you have any enquiries about this publication, please email the Chief Statistician's Unit, the Home Office Unit which produced the statistics, at:

CSU.Statistics@homeoffice.gsi.gov.uk.

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and 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; and
- are managed impartially and objectively in the public interest.

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

This statistical release is a National Statistics output produced to the highest professional standards and free from political interference. It has been produced by Home Office statisticians working in the Chief Statistician's Unit 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.

Summary

Introduction

1. Following the transposition of European Directive 2010/63/EU into UK law through amendment regulations to the Animals (Scientific Procedures) Act 1986, some changes have been made to the collection. The 2014 figures in this release are the first year for which these changes apply. In particular, information is now collected on procedures completed, not procedures started, as for previous publications. This has enabled details on the actual severity of procedures to be collected for the first time. See introductory notes, changes to the data collection section, for more details, including on other changes to the collection.
2. As a result of changes to the reporting requirements and the data collection format, the 2014 data and comparisons with previous years' data should be interpreted with some caution. See introductory notes, data quality section, for more details.

Total procedures

(Table 1)

3. In 2014, a total of 3.87 million procedures were completed. Of these, 1.94 million (50%) related to the creation/breeding of genetically altered animals¹² that were not used in further procedures and the remaining 1.93 million (50%) were experimental procedures¹³.
4. Between 2005 and 2013, the total number of procedures increased by 42% (1.23 million procedures). The creation/breeding of genetically altered animals primarily accounted for this rise (1.08 million procedures) whilst the increase in the number of experimental procedures was much smaller (148 thousand procedures). When comparing 2014 with 2013:
 - the total of 3.87 million procedures represents a decrease of 6% (-254 thousand procedures);
 - the 1.94 million genetically altered animals created/bred but not used in further procedures represents a decrease of 8% (-162 thousand procedures);
 - the 1.93 million experimental procedures undertaken represents a fall of 5% (-92 thousand procedures).

¹² The creation/breeding of genetically altered animals includes the use of animals for the creation of new lines of genetically altered animals and the breeding of established lines of genetically altered animals that were not used in further regulated procedures. This category also includes some animals that were bred with the intention of producing genetically altered animals, but resulted in non-genetically altered animals being born (9% of procedures involving the creation/breeding of genetically altered animals).

¹³ Experimental procedures includes all animals used in basic research, regulatory use, translational/applied research, protection of the natural environment, higher education and training, preservation of species and forensic enquiries. It excludes the use of animals for the creation of new lines of genetically altered animals and the breeding of established lines of genetically altered animals that were not used in further regulated procedures.

Total number of procedures by creation/breeding of genetically altered animals and experimental procedures, 2005–2014

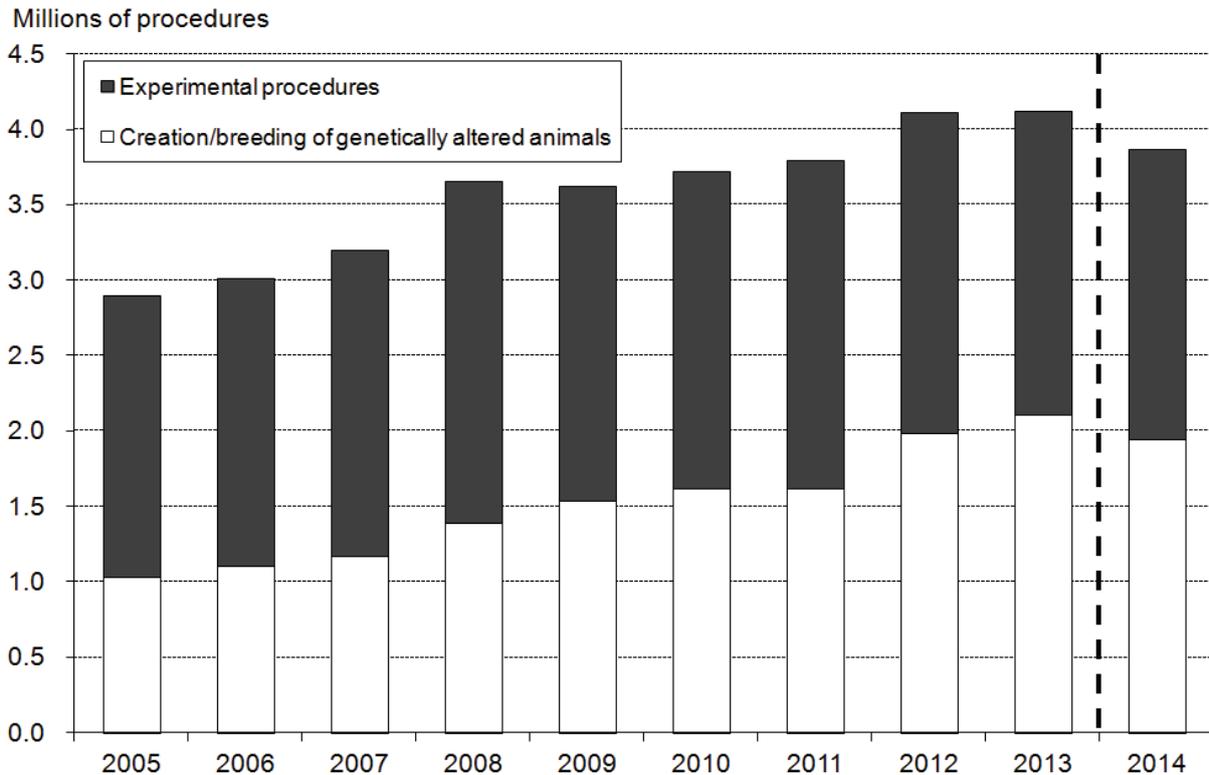


Chart notes: The data collection methodology changed in 2014 (see introductory notes, changes to the data collection section) and comparisons with previous years' data should be made with some caution (see introductory notes, data quality section).

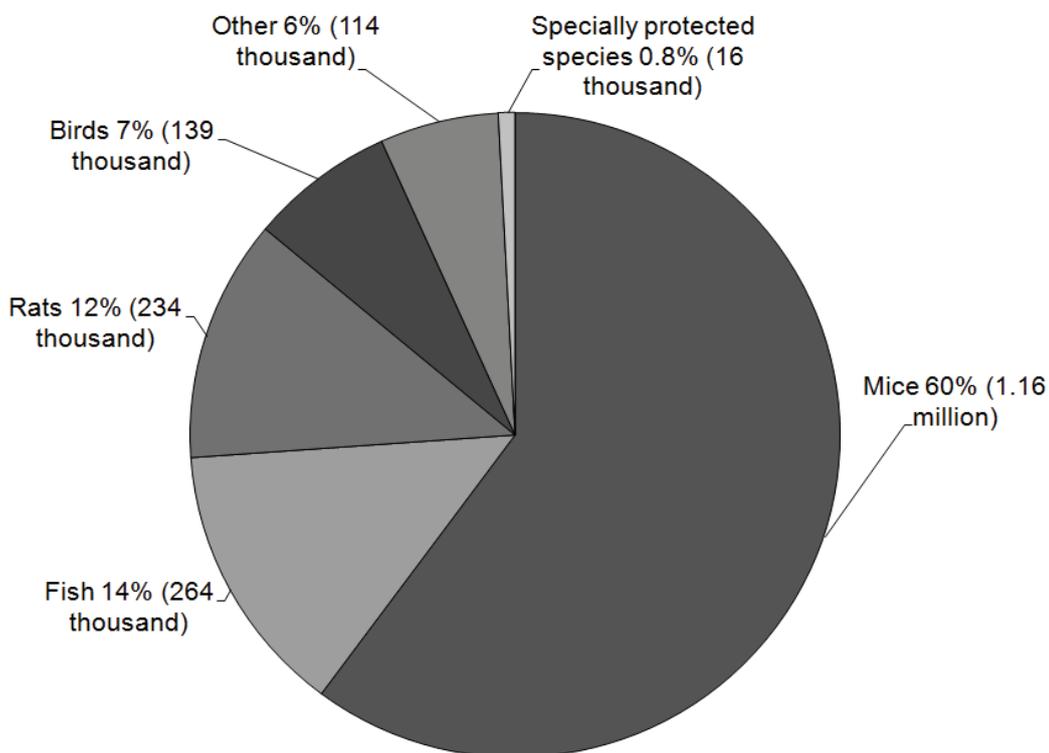
Experimental procedures

(Tables 1, 3)

- Of the 1.93 million experimental procedures completed in 2014, the majority involved mice (60% or 1.16 million procedures), fish (14% or 264 thousand procedures), rats (12% or 234 thousand procedures) and birds (7% or 139 thousand procedures). Experimental procedures involving specially protected species (i.e. horses¹⁴, dogs, cats, and non-human primates) accounted for 0.8% (16 thousand) of procedures in 2014, the same proportion as in 2013.

¹⁴ Includes donkeys and cross-bred horses.

Experimental procedures by species, 2014



6. Comparing 2014 with 2013 by species.

- There was an increase in experimental procedures involving amphibians, up 44% to 13 thousand procedures in 2014, and hamsters, up 48% to 2,800 procedures. The increase in amphibians is likely to be mainly attributable to collecting information on procedures involving free feeding larval forms (e.g. tadpoles) for the first time.
- There were decreases in experimental procedures involving mice, down 8% to 1.16 million procedures, and rabbits, down 8% to 14 thousand procedures in 2014. No procedures involved the use of reptiles in 2014 whereas there were 700 such procedures in 2013.
- There was also a fall in experimental procedures involving specially protected species, down 7% to 16 thousand procedures in 2014, with decreases in procedures involving horses and dogs accounting for nearly all of this fall.

7. Of the severity assessments undertaken for the 1.93 million experimental procedures completed in 2014:

- 9% (180 thousand) were assessed as sub-threshold;
- 7% (133 thousand) were assessed as non-recovery;¹⁵
- 51% (980 thousand) were assessed as mild;
- 25% (483 thousand) were assessed as moderate; and
- 8% (150 thousand) were assessed as severe.

¹⁵ Non-recovery procedures are procedures performed entirely under general anaesthesia from which the animal does not recover consciousness.

Creation/breeding of genetically altered animals

(Tables 1, 8)

8. Of the 1.94 million procedures in 2014 relating to the creation/breeding of genetically altered animals that were not used in further procedures, nearly all involved mice (91% or 1.76 million procedures), zebrafish (8% or 154 thousand procedures) and rats (1% or 20,100 procedures).
9. Of the severity assessments undertaken for these 1.94 million procedures:
 - 46% (898 thousand) were assessed as sub-threshold;
 - 0.1% (1,900) were assessed as non-recovery;
 - 48% (934 thousand) were assessed as mild;
 - 4% (74 thousand) were assessed as moderate; and
 - 2% (34 thousand) were assessed as severe.

Commentary

Introduction

Following the transposition of European Directive 2010/63/EU into UK law through amendment regulations to the Animals (Scientific Procedures) Act 1986, some changes have been made to the collection. The 2014 figures in this release are the first year for which they apply. In particular, information is now collected on procedures completed, not procedures started, as for previous publications. This has enabled details on the actual severity of procedures to be collected for the first time. See introductory notes, changes to the data collection section, for more details, including on other changes to the collection.

As a result of changes to the reporting requirements and data collection format, the 2014 data and comparisons with previous years' data should be interpreted with some caution. See introductory notes, data quality section, for more details.

Total procedures

Introduction

(Tables 1 and 1a)

In 2014, a total of 3.87 million procedures were completed. Whilst comparisons with previous years' data should be made with some caution (see introductory notes, data quality section), this represents a fall of 6% (-254 thousand) procedures compared with 2013. There were 3.80 million animals used for the first time in procedures completed in 2014, representing a decrease of 5% (-218 thousand) animals compared with 2013.

Of the 3.87 million scientific procedures completed in 2014, 67 thousand involved the re-use of animals. It is no longer possible to ascertain the number of animals re-used given the changes to the collection (see introductory notes, changes to the data collection section).

Figure 1 shows that the number of experiments increased considerably between 1945 and 1971, rising from 1.18 million to 5.61 million, and from that period on to 1986 the number decreased to 3.11 million. The implementation of the Animals (Scientific Procedures) Act 1986 changed the methodology of the collection from experiments to procedures¹⁶ and in 1987 data were collected based on both measures, the combined figure being 3.63 million experiments/procedures.

From 1988 onwards data for procedures alone were collected and in the following years the number decreased to 2.62 million in 2001, mainly due to a reduction in the use of rodents, rabbits and birds (although there was an increase in the number of procedures involving fish). Since then, the number of procedures has risen to 4.12 million in 2013, primarily due to an increase in the creation/breeding of genetically altered animals, with mice mainly accounting for the rise.

The overall level of scientific procedures is determined by a number of factors, including the economic climate and global trends in scientific endeavour. In recent years, while many types

¹⁶ The Cruelty to Animals Act 1876 covered all animals that were used in experiments, i.e. a procedure of unknown outcome. The Animals (Scientific Procedures) Act 1986 has a broader definition as it includes all scientific procedures that may cause pain, suffering, distress or lasting harm. Therefore, the methodological change accounted for the increase in figures from 1987 onwards.

of research have declined or even ended, the advent of modern scientific techniques has opened up new research areas, with genetically altered animals, mainly mice, often being required to support these areas.

Figure 1: Total experiments/procedures, 1945–2014

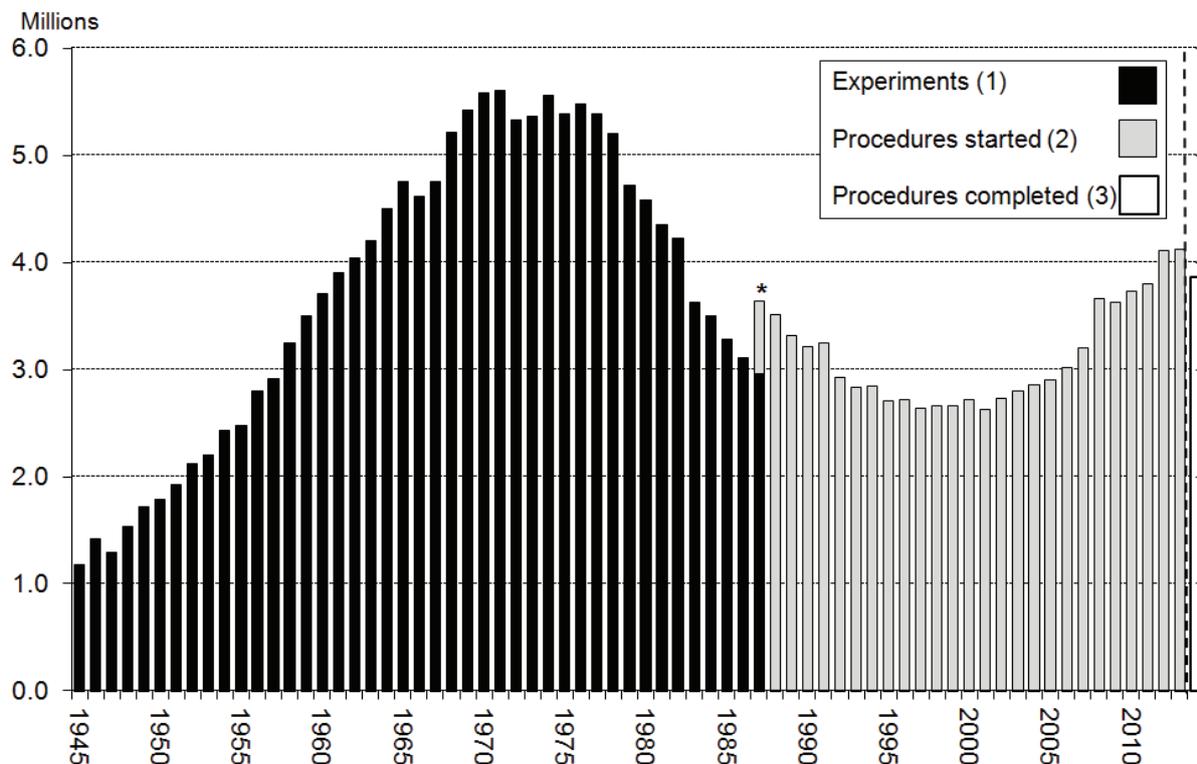


Chart notes:

(1) Experiments **started** under the Cruelty to Animals Act 1876.

(2) Scientific Procedures **started** under the Animals (Scientific Procedures) Act 1986.

(3) Following the transposition of European Directive 2010/63/EU into UK law, scientific procedures **completed** under the revised Animals (Scientific Procedures) Act 1986.

* The 1987 total includes experiments started under the 1876 Act as well as procedures started under the 1986 Act.

Primary purpose

(Table 1)

In 2014, a total of 3.87 million procedures were completed. Of those, as Figure 2 shows, 1.94 million (50%) were to create/breed genetically altered animals that were not used in further procedures (genetically altered animals created/bred and subsequently used in further procedures are reported under experimental procedures). The remaining 1.93 million procedures (50%) were used for experimental purposes, and, of these:

- 1.04 million (27% of the total 3.87 million procedures) were undertaken for basic research¹⁷;

¹⁷ Studies that are designed to add knowledge about the normal and abnormal structure, functioning and behaviour of living organisms and the environment. These include fundamental studies in toxicology.

- 508 thousand (13% of the total 3.87 million procedures) were undertaken for regulatory use¹⁸;
- 358 thousand (9% of the total 3.87 million procedures) were undertaken for translational/applied research¹⁹;
- 20 thousand (0.5% of the total 3.87 million procedures) were undertaken for other purposes.²⁰

Figure 2: Total procedures by primary purpose, 2014

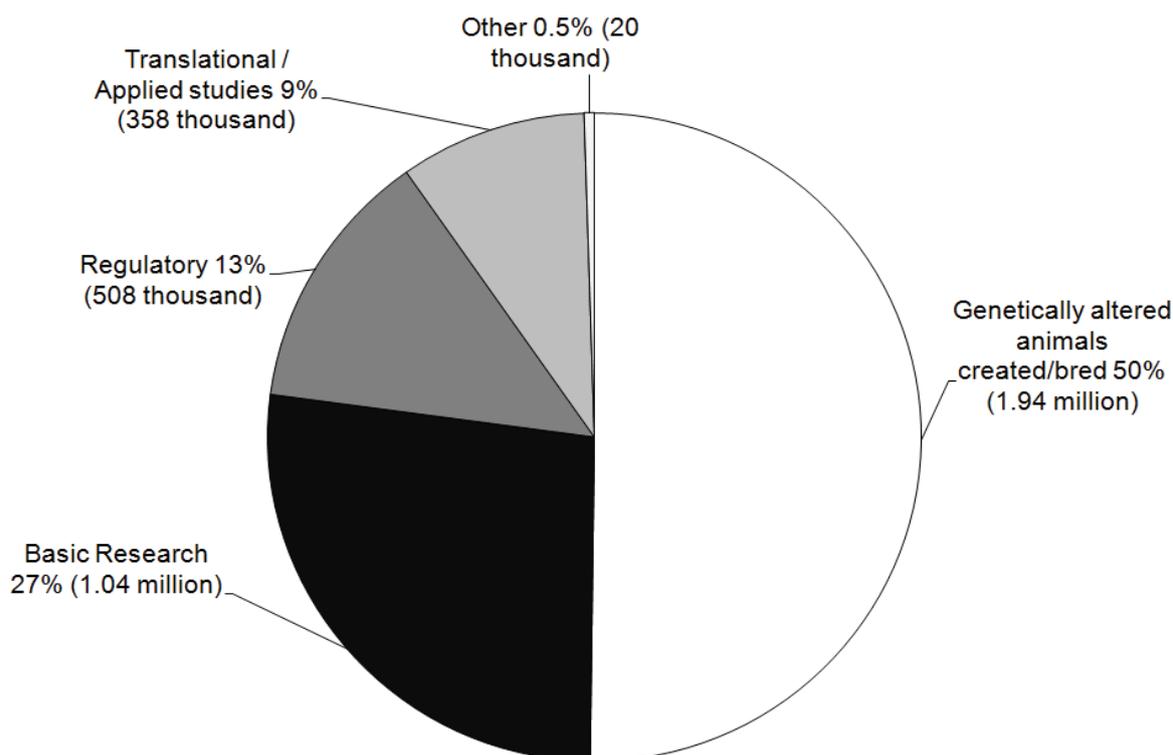


Figure 3 shows that, between 2005 and 2013, the total number of procedures increased by 42% (1.23 million procedures). The breeding of genetically altered animals primarily accounted for this rise (1.08 million procedures) whilst the increase in the number of experimental procedures was much smaller (148 thousand procedures).

The proportion of procedures accounted for by the breeding of genetically altered animals rose from 35% in 2005 to 51% in 2013. For experimental procedures, the proportion involving the use of genetically altered animals over the same period remained stable at 32%.

¹⁸ All procedures carried out to satisfy legal requirements including the production of substances to legal specification, such as material for diagnostic tests (e.g. blood products), studies to evaluate the safety or effectiveness of pharmaceuticals and studies to evaluate the safety of other chemicals.

¹⁹ Studies that are designed to address human or animal disease including development of drugs and treatments but excluding studies carried out for regulatory purposes.

²⁰ Other procedures covers protection of the environment (16 thousand procedures or 0.4% of all procedures), higher education or training (1,800 or 0.05% of all procedures) preservation of species (1,300 procedures or 0.03% of all procedures), and forensic enquiries (20 procedures or 0.001% of all procedures).

Whilst comparisons with previous years' data should be made with some caution (see introductory notes, data quality section), when comparing 2014 with 2013:

- the total of 3.87 million procedures represents a decrease of 6% (-254 thousand procedures);
- the 1.94 million genetically altered animals created/bred but not used in further procedures represents a decrease of 8% (-162 thousand procedures);
- the 1.93 million experimental procedures undertaken represents a fall of 5% (-92 thousand procedures).

Figure 3: Total procedures by creation/breeding of genetically altered animals and experimental procedures, 2005–2014

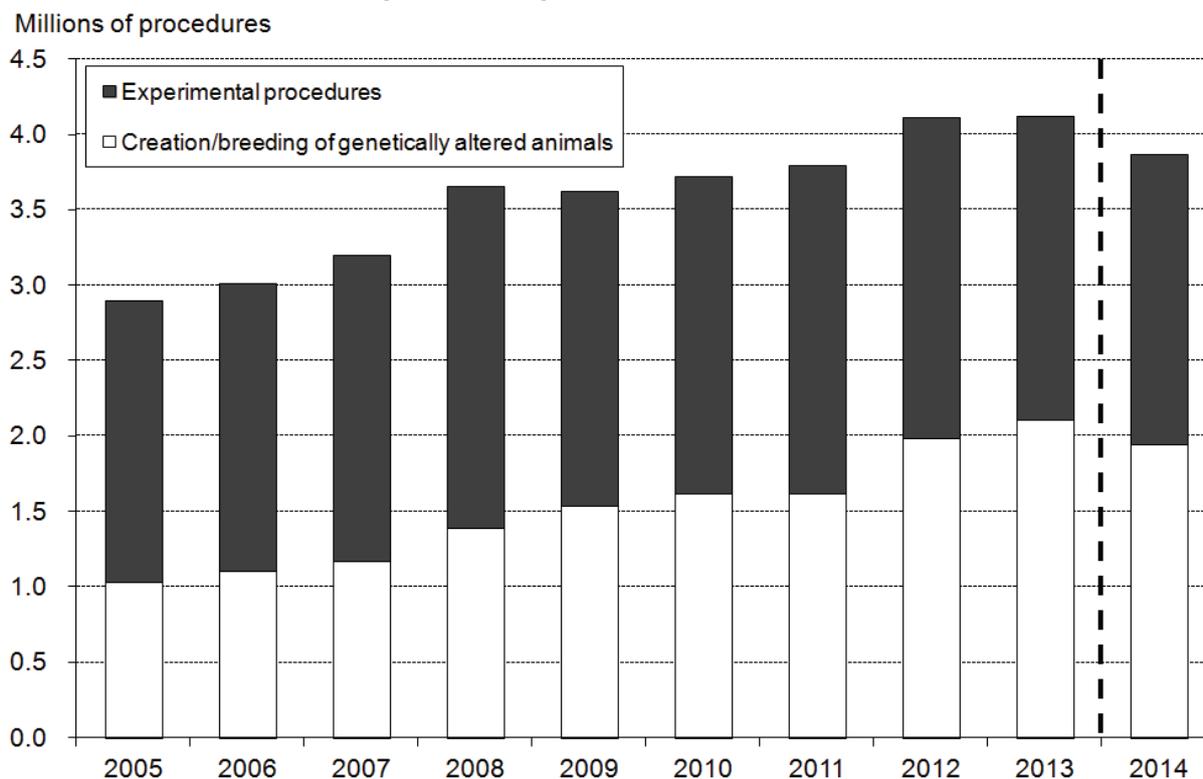


Chart notes: The data collection methodology changed in 2014 (see introductory notes, changes to the data collection section) and comparisons with previous years' data should be made with some caution (see introductory notes, data quality section).

Type of establishment

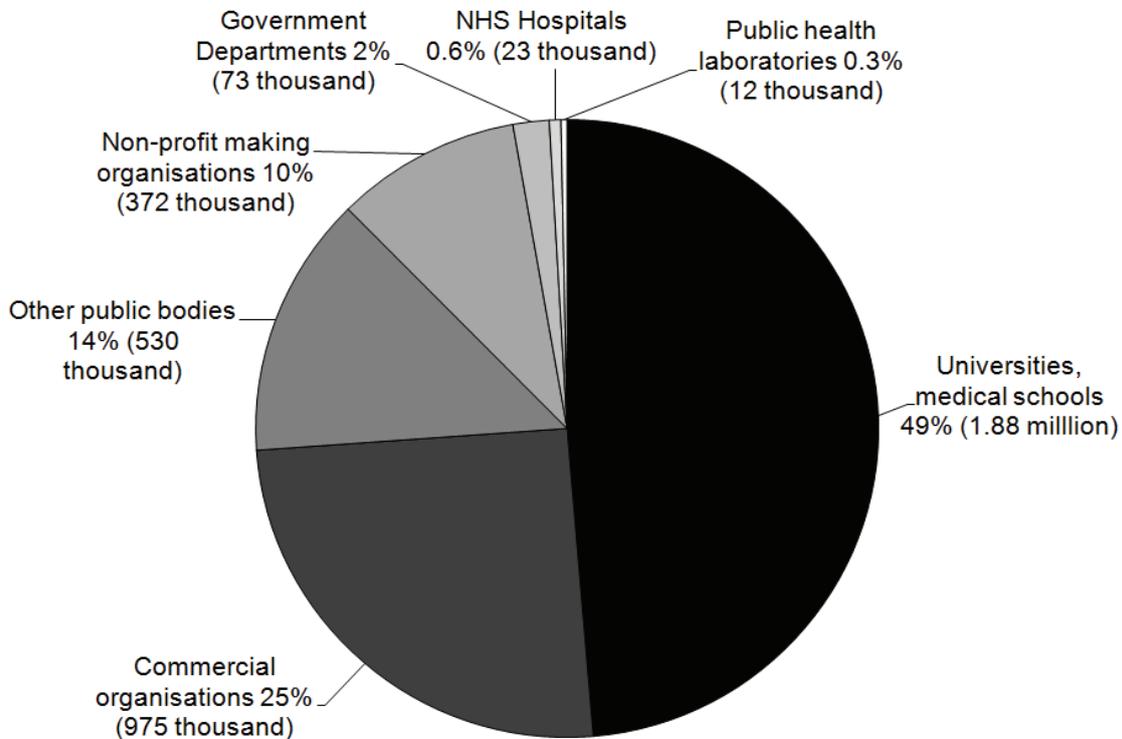
(Table 11)

Of the total 3.87 million procedures completed in 2014, as Figure 4 shows:

- universities accounted for 49% (1.88 million) and held 77% of the 3,134 project licences;
- commercial organisations accounted for 25% (975 thousand) and held 8% of project licences;
- other public bodies accounted for 14% (530 thousand) and held 7% of project licences;

- non-profit organisations accounted for 10% (372 thousand) and held 4% of project licences.

Figure 4: Total procedures by establishment type, 2014



Severity

(Tables 3 and 8)

For the first time, information has been collected on the actual severity of procedures (see introductory notes, changes to the data collection section) and it is likely that there has been some inconsistency in the reporting of these data. Therefore, the severity data should be interpreted with some caution (see introductory notes, data quality section).

The severity of procedural harms (i.e. excluding harms caused to animals as a result of non-procedural events such as transport and housing) is assessed as one of five categories as follows.

- **Sub-threshold:** When a procedure was authorised under a project licence but did not actually cause suffering above the threshold of regulation (ASPA 2 (1)) 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:** The key characteristic of mild procedures is that any pain or suffering experienced by an animal is, 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 characteristic of moderate procedures is that they do cause a significant and easily detectable disturbance to an animal's normal state, but this is 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 characteristics of severe procedures are that they cause a major departure from the animal's usual state of health and well-being. It would usually include long-term disease processes where assistance with normal activities such as feeding and drinking are 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.

Full details of severity assessment and classification can be found in Annex 8 of the European Directive and in the Home Office guidance notes²¹.

Of the 1.93 million experimental procedures completed in 2014:

- 9% (180 thousand) were assessed as sub-threshold;
- 7% (133 thousand) were assessed as non-recovery;
- 51% (980 thousand) were assessed as mild;
- 25% (483 thousand) were assessed as moderate;
- 8% (150 thousand) were assessed as severe.

Of the 1.94 million genetically altered animals created/bred in 2014, as Figure 5 shows, the severity assessments overall were lower than those given for experimental procedures:

- 46% (898 thousand) were assessed as sub-threshold;
- 0.1% (1,900) were assessed as non-recovery;
- 48% (934 thousand) were assessed as mild;
- 4% (74 thousand) were assessed as moderate;
- 2% (34 thousand) were assessed as severe.

²¹ See:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/276014/NotesActualSeverityReporting.pdf.

Figure 5: Severity assessments by experimental procedures and creation/breeding of genetically altered animals, 2014

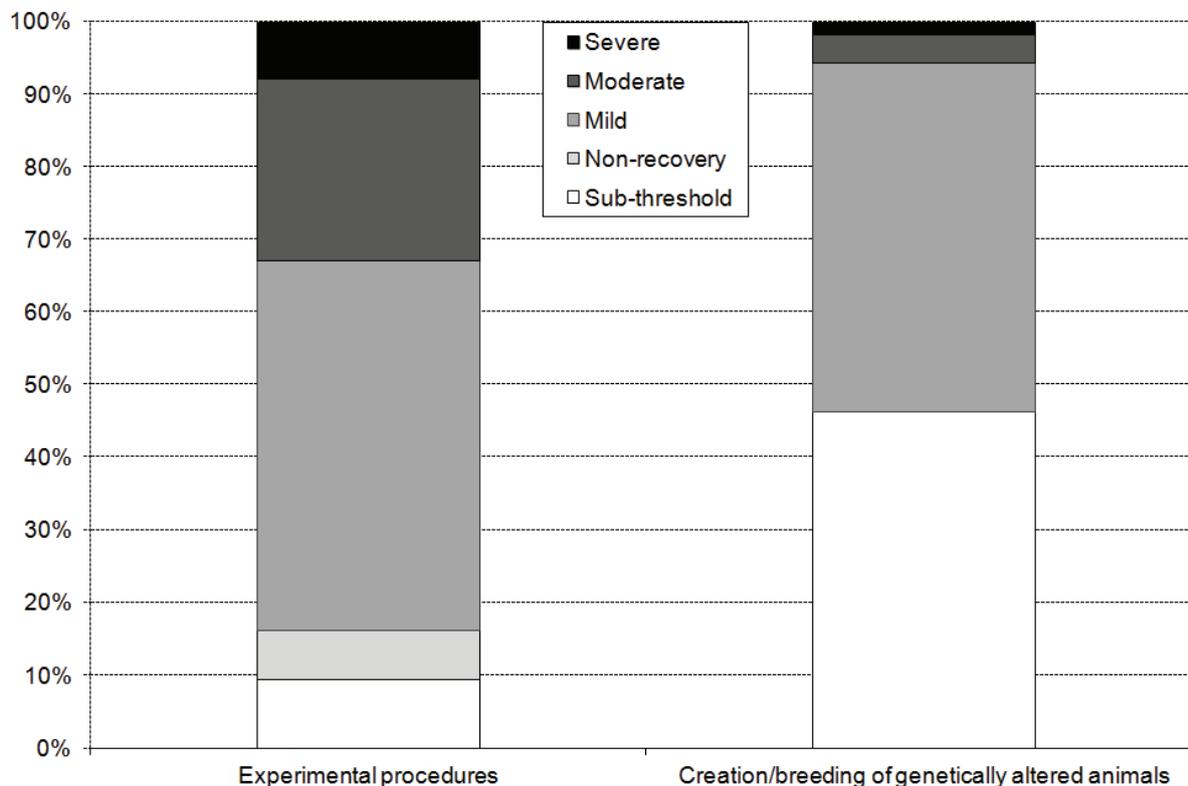


Chart notes: For the first time, information has been collected on the actual severity of the procedures (see introductory notes, changes to the data collection section) and the severity data should be interpreted with some caution (see introductory notes, data quality section).

The severity of genetically altered animals created/bred is assessed from:

- the 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 for genotyping²², the biopsy procedures will generally be assessed as mild;
- the animals assessed as severe in this category are expected to be 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 genetically altered animals will have been subjected to surgical or minor procedures such as the injection of drugs or viral vectors (i.e. viruses containing the genes of interest).

²² 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.

Experimental procedures

(Tables 1-7.4)

Introduction

Experimental procedures include all animals used in basic research, regulatory use, translational/applied research, protection of the natural environment, higher education and training, preservation of species, and forensic enquiries. It excludes the use of animals for the creation of new lines of genetically altered animals and the breeding of established lines of genetically altered animals that were not used in further regulated procedures. However, experimental procedures does include genetically altered animals that were used in regulated procedures.

Species used in experimental procedures

(Table 1)

As Figure 6 shows, of the 1.93 million experimental procedures completed in 2014:

- mice accounted for 60% (1.16 million procedures);
- fish²³ 14% (264 thousand procedures);
- rats 12% (234 thousand procedures);
- birds²⁴ 7% (139 thousand procedures); and
- other species²⁵ 6% (114 thousand procedures).

Experimental procedures involving specially protected species (i.e. horses²⁶, dogs, cats, and primates²⁷) accounted for 0.8% (16 thousand) of experimental procedures in 2014. Of these, horses accounted for 0.4% (8,100) of all experimental procedures, dogs 0.2% (4,100), primates 0.2% (3,200) and cats 0.01% (210).

Whilst comparisons with previous years' data should be made with some caution (see introductory notes, data quality section), comparing experimental procedures for 2014 with 2013 by species.

- There were increases in experimental procedures involving amphibians, up 44% to 13 thousand procedures in 2014, and hamsters, up 48% to 2,800 procedures in 2014. The increase in amphibians is likely to be mainly attributable to collecting information on procedures involving free feeding larval forms (i.e. tadpoles) for the first time.

²³ Data on all fish species are grouped together here but data on zebrafish and other fish species are collected and published separately.

²⁴ Data on all bird species are grouped together here but data on domestic fowl and other bird species are collected and published separately.

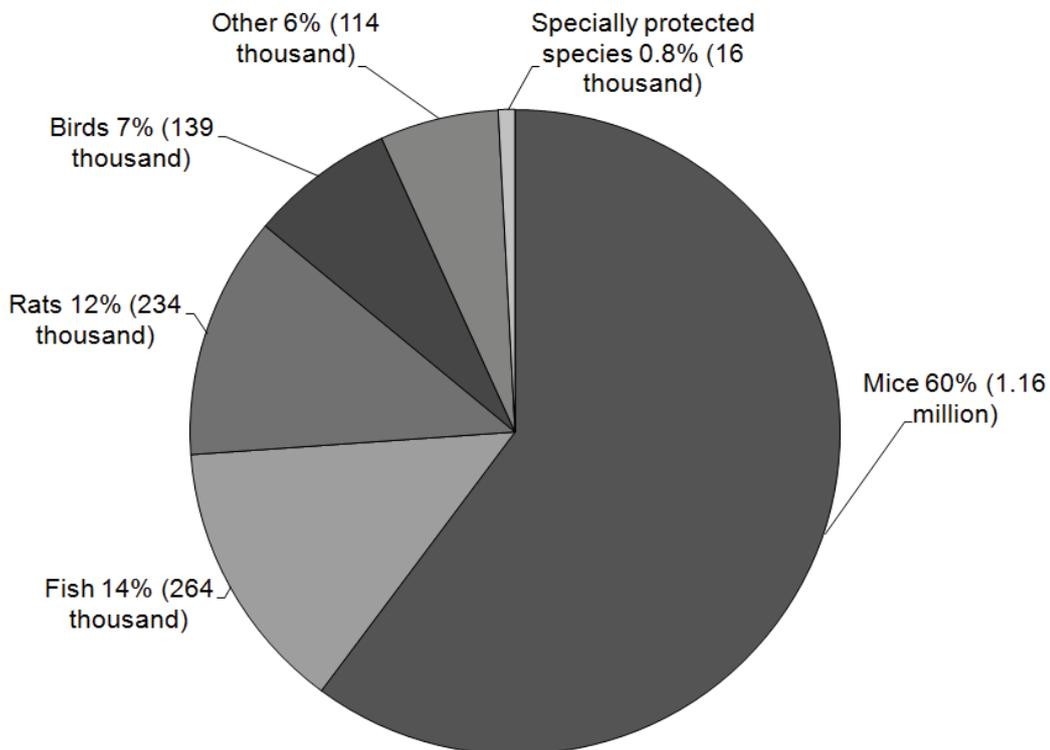
²⁵ Includes guinea pigs, Syrian hamsters, Chinese hamsters, Mongolian gerbils, all other rodents, rabbits, ferrets, all other carnivores, pigs, goats, sheep, cattle, all other mammals, reptiles, *Rana Temporaria* and *Pipiens*, *Xenopus Laevis* and *Tropicalis* and all other amphibians. This information is grouped together here but data on these species are collected and published separately.

²⁶ Includes donkeys and cross-bred horses.

²⁷ Data on all primate species are grouped together here but data on cynomolgus monkeys, rhesus monkeys and marmosets and tamarins are collected and published separately.

- There were decreases in experimental procedures involving mice, down 8% to 1.16 million procedures in 2014, and rabbits, down 8% to 14 thousand procedures in 2014. No procedures involved the use of reptiles in 2014 whereas 700 did in 2013.
- There was also a fall in experimental procedures involving specially protected species, down 7% to 16 thousand procedures in 2014, with decreases in procedures involving horses and dogs accounting for nearly all of this fall.
- Whilst the 3% decrease in experimental procedures involving ungulates²⁸ (53 thousand procedures in 2014) was a smaller change than for other species groupings, this includes a 5% fall for procedures involving sheep (44 thousand in 2014), a 50% fall for procedures involving goats (340 in 2014), and a 27% rise for procedures involving cattle (5,500 procedures in 2014).
- Whilst the 2% rise in experimental procedures involving fish (264 thousand procedures in 2014) was a smaller change than for other species groupings, this includes a 60% rise in procedures involving zebrafish (131 thousand in 2014).
- Whilst the 0.3% rise in experimental procedures involving primates (3,200 procedures in 2014) was a smaller change than for other species groupings, this includes a 12% rise in procedures involving cynomolgus monkeys (3,000 in 2014), a 43% fall in procedures involving rhesus monkeys (160 in 2014) and a 58% fall in procedures involving marmosets and tamarins (130 in 2014).

Figure 6: Experimental procedures by species, 2014



²⁸ Data on ungulates are grouped together here but data on pigs, goats, sheep and cattle are collected and published separately.

Use of mice, rats, and fish in experimental procedures

(Table 1)

Figure 7 below shows trends in the number of procedures involving the three most commonly used species (mice, rats and fish). The number of procedures involving mice, the most frequently used species of the three throughout the series, rose overall from 1.01 million in 2005 to 1.28 million in 2012 with the figure then falling to 1.25 million in 2013. Whilst comparisons between 2014 and previous years should be made with some caution, the figure then fell by 8% to 1.16 million procedures in 2014.

The number of procedures involving rats consistently fell between 2005 and 2013, decreasing from 406 thousand to 236 thousand procedures. The figure then fell by 1% to 234 thousand procedures in 2014.

The number of procedures involving fish varied between 2005 and 2013, ranging from 181 thousand in 2005 to 482 thousand in 2008. Compared with 2013, the number of procedures involving fish increased by 2% to 264 thousand in 2014.

The availability of genetically altered zebrafish has led to an increase in the use of this species in basic and applied biomedical research. This is reflected in data on the use of zebrafish now being separately collected from other fish species, following the inclusion of zebrafish in Schedule 2 of the Animal (Scientific Procedures) Act 1986. In 2014, Zebrafish accounted for 50% (131 thousand) of all experimental procedures on fish.

Figure 7: Experimental procedures involving mice, rats and fish, 2005–2014

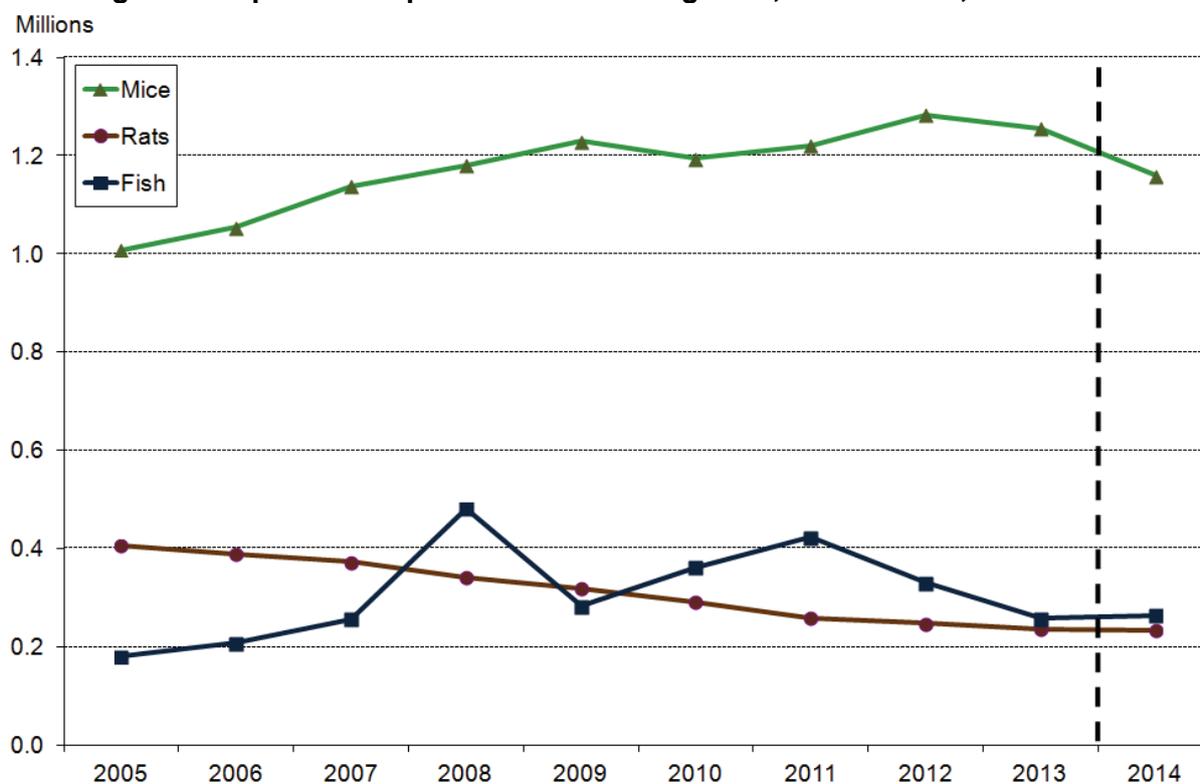


Chart notes: The data collection methodology changed in 2014 (see introductory notes, changes to the data collection section) and comparisons with previous years' data should be made with some caution (see introductory notes, data quality section).

Use of primates in experimental procedures

(Table 1)

Figure 8 shows trends in the number of procedures involving Old World and New World monkeys from 2005 to 2014. The use of Old World monkeys has been more common throughout the period. Old World monkeys, which are predominately used for regulatory purposes, are considered to be more relevant models for some human conditions compared with New World monkeys. Since 2013, for Old World monkeys, separate breakdowns have been collected for cynomolgus macaques and rhesus macaques.

From 4,200 procedures in 2008, the use of Old World monkeys then fell to 2,100 procedures in 2011. Since then, the figure rose to 2,900 in 2013. Whilst comparisons between 2014 and previous years' data should be made with caution, the figure then rose by 6% to 3,100 procedures in 2014.

The number of procedures involving the use of New World monkeys rose from 370 procedures in 2008 to 1,100 procedures in 2010. Since then, the numbers fell overall to 310 procedures in 2013, as changing patterns of research have led to a decline in their use. The figure then fell by 58% to 130 procedures in 2014.

Figure 8: Experimental procedures involving Old World and New World monkeys, 2005–2014

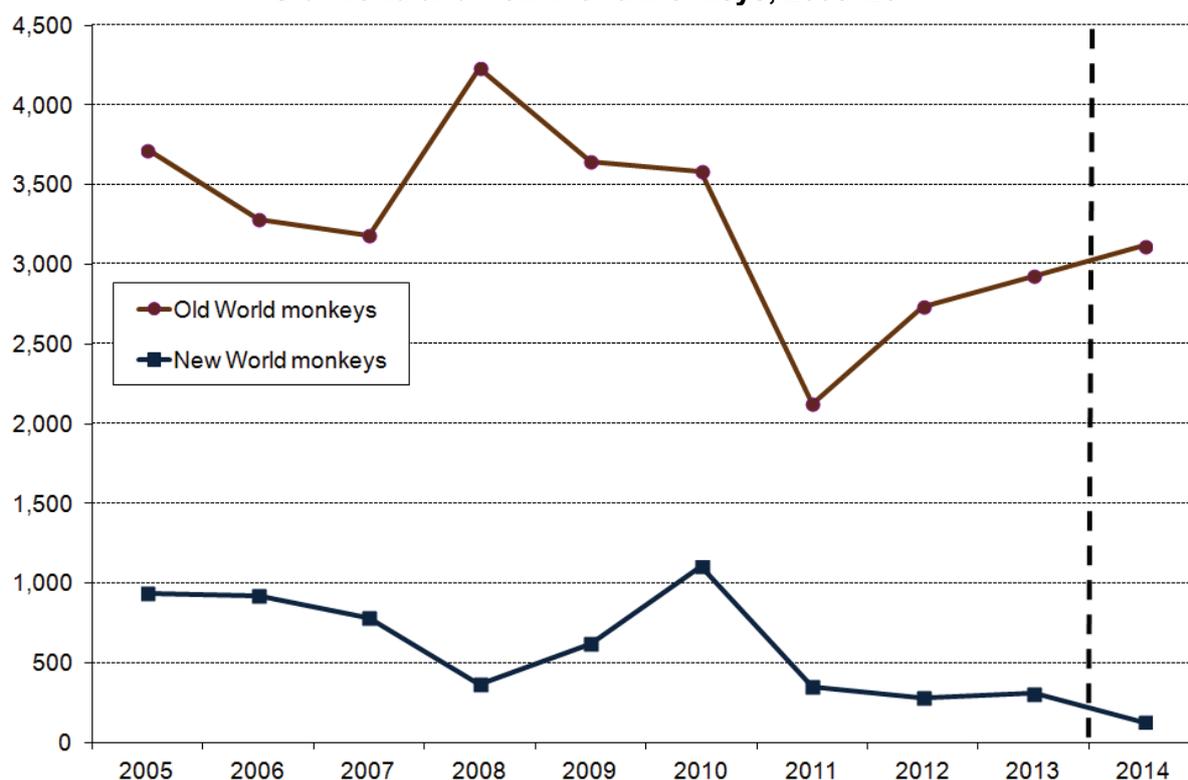


Chart notes (1): In 2005, for Old World monkeys, there were 3,700 procedures involving macaques and, for New World monkeys, there were 910 procedures involving marmosets and tamarins, and 20 procedures involving squirrel, owl and spider monkeys. Since 2006, only macaques and marmosets and tamarins have been used in procedures. The data collection methodology changed in 2014 (see introductory notes, changes to the data collection section) and comparisons with previous years' data should be made with some caution (see introductory notes, data quality section).

Species on which no experimental procedures were completed in 2014

In 2014, there were no experimental procedures completed involving:

- Chinese hamsters;
- a number of primate species (no great apes have been used since the current legislation (the 1986 Act) was implemented in 1987 and the use of great apes has not been permitted since 2013);
- reptiles;
- cephalopods²⁹.

Source and generation of animals used in experimental procedures (Tables 2.1-2.3)

Figures are presented here on the source of animals which were used for the first time in experimental procedures in 2014. Information on the source of re-used animals is not collected.

Species listed in Schedule 2 of the Animal (Scientific Procedures) Act 1986 (see appendix, paragraph 15) must be purpose bred, unless the Secretary of State has specifically authorised sourcing from elsewhere (e.g. wild caught birds and small rodents). This is generally only authorised when there is a scientific justification for doing so. There is no requirement for species not listed in Schedule 2 to be purpose bred.

Excluding non-human primates (covered below), of the 1.86 million animals used in experimental procedures for the first time in 2014 (includes species listed and not listed in Schedule 2):

- 97% (1.81 million animals) were born in the UK (1.55 million animals were born at a licensed breeder and 256 thousand animals were not);
- 2% (34 thousand animals) were born in the EU (30 thousand animals were born at a licensed breeder and 3,900 animals were not);
- 0.04% (660 animals) were born in the rest of Europe;
- 0.8% (15 thousand animals) were born in the rest of the world.

Of the 2,500 primates used for the first time in experimental procedures in 2014:

- 17% (410 primates) were born in the EU at a licensed breeder;³⁰
- 54% (1,300 primates) were born in Africa;
- 29% (720 primates) were born in Asia.

Of the 2,500 primates used for the first time in experimental procedures in 2014:

- 28% (690 primates) were from a second generation, or greater, primate (i.e. grandparent or earlier generation were wild caught);

²⁹ Marine invertebrate animals such as an octopus or squid.

³⁰ UK breakdowns will be collected from 2015 onwards.

- 72% (1,800 primates) originated from self-sustaining colonies;³¹
- no wild caught primates were used.

Genetic status of animals used in experimental procedures

(Table 4)

As Figure 9 shows, the number of experimental procedures *not* involving genetically altered animals fell overall from 1.65 million procedures in 2008 to 1.37 million procedures in 2013. Whilst comparisons between 2014 and previous years should be made with some caution, the figure then fell by 5% to 1.31 million procedures in 2014.

The number of procedures involving genetically altered animals rose from 420 thousand in 2005 to 679 thousand in 2012, falling to 646 thousand in 2013. The figure then fell by 4% to 618 thousand procedures in 2014.

For genetically altered animals from 2014 onwards, separate breakdowns are now collected for animals with a harmful phenotype (i.e. a harmful physical or biochemical defect) and animals without a harmful phenotype. Many lines of genetically altered animals do not exhibit any harmful phenotype and are visually and behaviorally indistinguishable from wild type animals. Some show a harmful phenotype from birth, e.g. immune deficient mice; others are overtly normal at birth but exhibit a harmful phenotype, such as developing tumours, as they age. Animals are reported as being without a harmful phenotype if used/killed at an age prior to the development of the harmful effect.

In 2014, 26% of experimental procedures (499 thousand) involved genetically altered animals without a harmful phenotype and 6% (120 thousand) involved genetically altered animals with a harmful phenotype.

In previous years data were collected separately on genetically modified animals and animals with a harmful genetic mutation. In 2014, data on these were collected together as genetically altered animals (either with or without a harmful phenotype). The definitions for genetically altered animals are fully comparable between 2014 and pre-2014 figures.

³¹ As defined in the Animals (Scientific Procedures) Act 1986, a colony of animals is a self sustaining colony if:

- (a) the colony is kept in captivity in a way that ensures the animals are accustomed to humans;
- (b) the colony consists only of animals that have been bred in captivity; and
- (c) the colony is sustained only by animals being bred within the colony or animals being sourced from other colonies that meet paragraphs (a) and (b).

Figure 9: Experimental procedures by genetic status of animal, 2005–2014

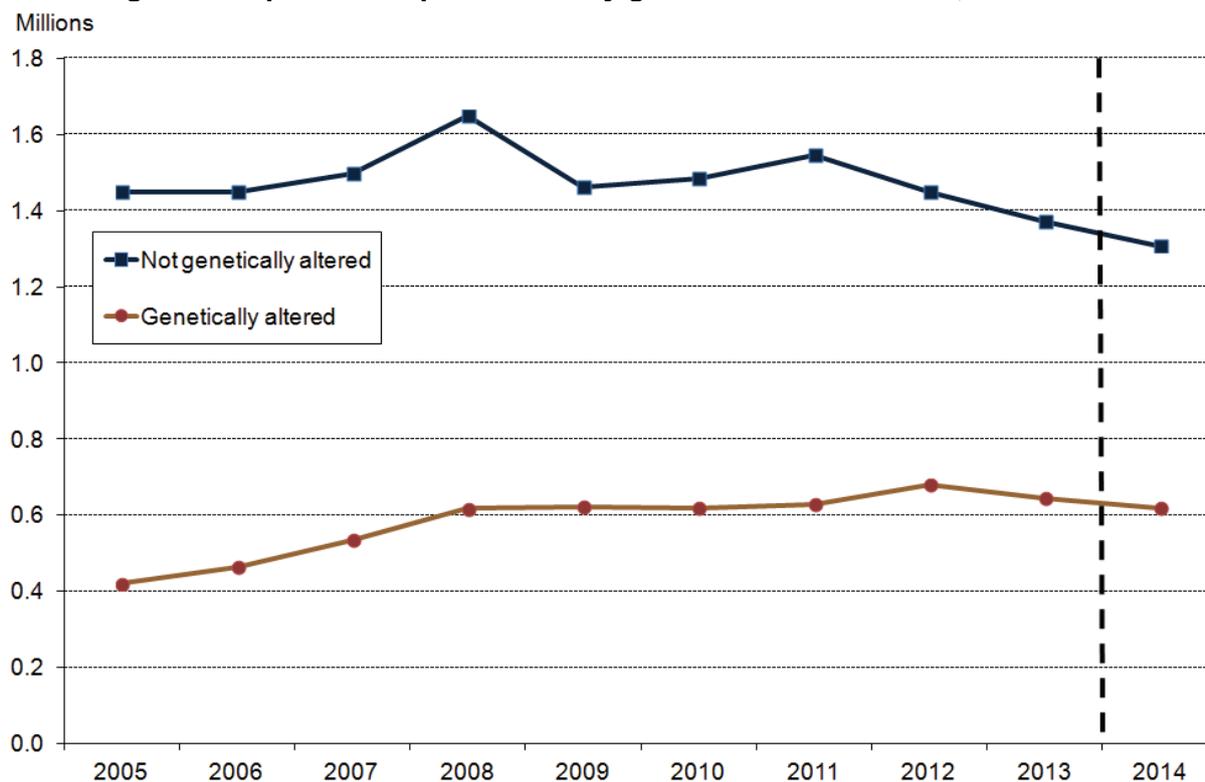


Chart notes: The data collection methodology changed in 2014 (see introductory notes, changes to the data collection section) and comparisons with previous years' data should be made with some caution (see introductory notes, data quality section).

Severity assessments of animals used in experimental procedures (Table 3)

For the first time, information has been collected on the actual severity of the procedures (see introductory notes, changes to the data collection section) and it is likely that there has been some inconsistency in the reporting of these data. Therefore, the severity data should be interpreted with some degree of caution (see introductory notes, data quality section).

Severity assessments by purpose are presented below. As Figure 10 shows, this varies according to the type of procedure, with regulatory purposes tending to have higher severity assessments and basic research tending to have lower severity assessments.

Figure 10: Severity assessments of experimental procedures by purpose, 2014

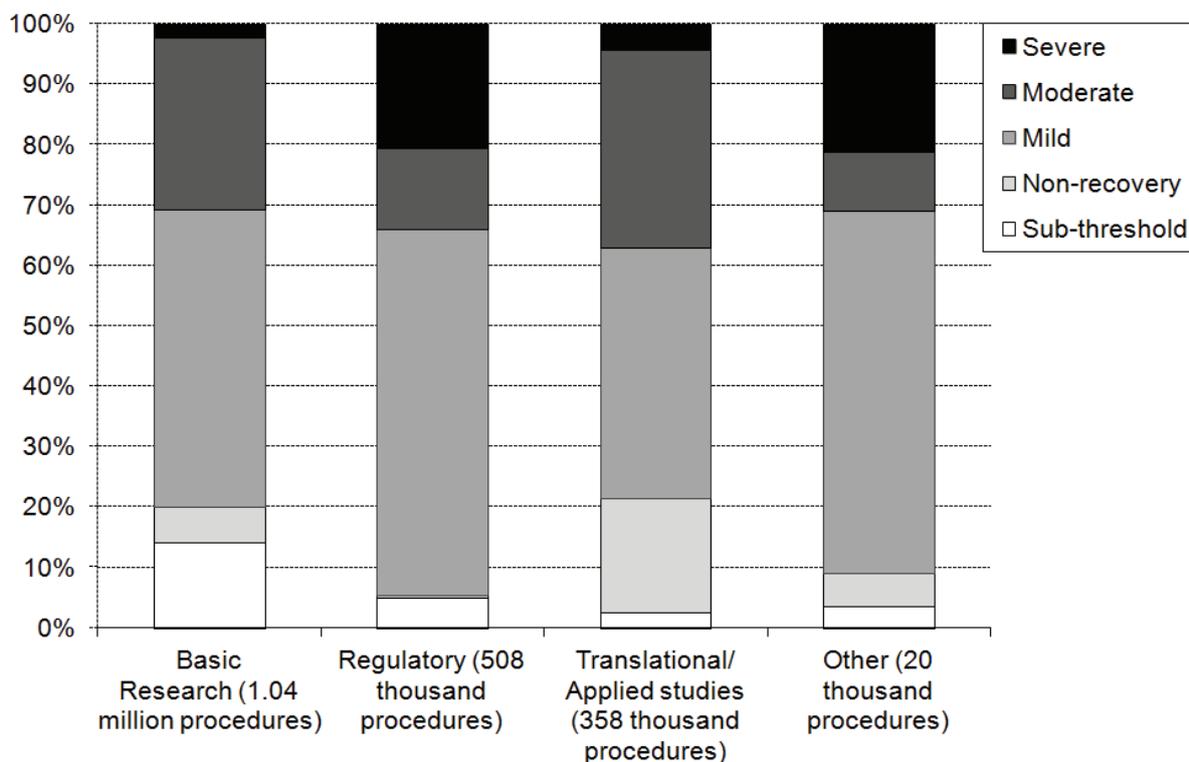


Chart notes: For the first time, information has been collected on the actual severity of the procedures (see introductory notes, changes to the data collection section) and the severity data should be interpreted with some caution (see introductory notes, data quality section).

Other includes protection of the environment, higher education or training, preservation of species and forensic enquiries.

Purpose of experimental procedures

(Tables 5-7.4)

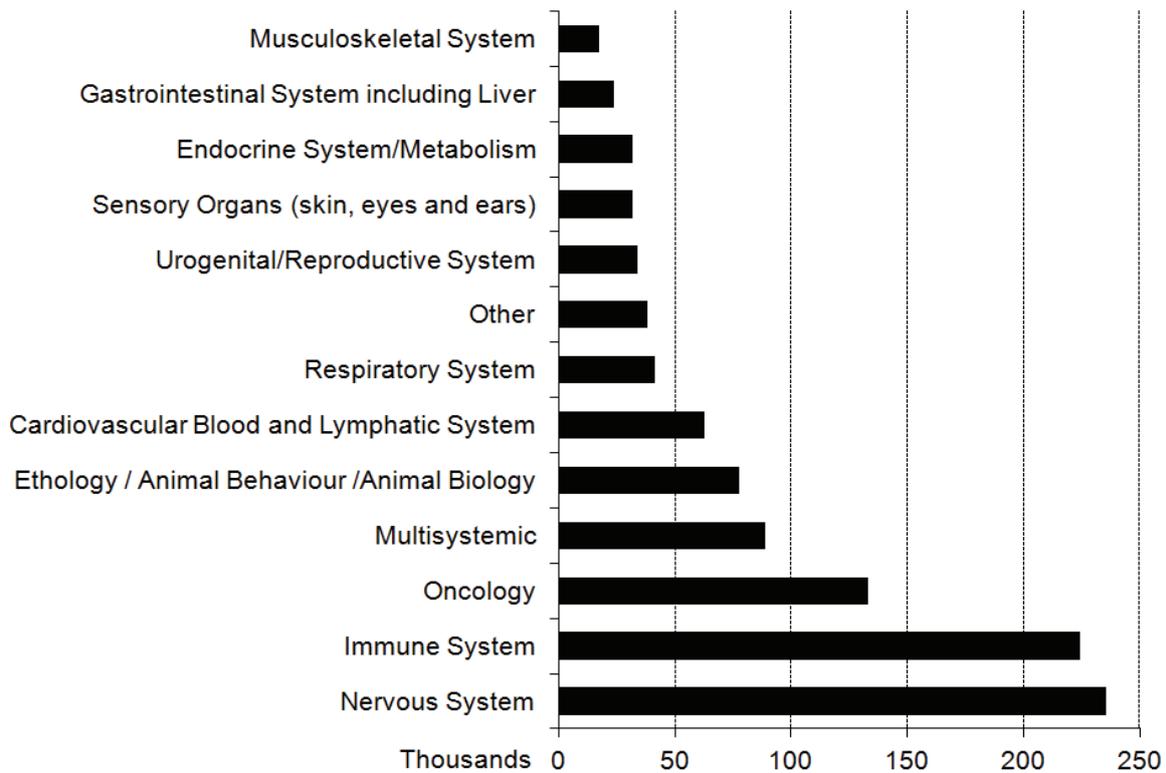
Basic research

(Table 5)

In 2014, 1.04 million procedures were undertaken for basic research purposes. Of those, 89% (924 thousand procedures) were undertaken for the study of oncology or specified organ systems, 7% (78 thousand) were undertaken for the study of animal biology (including ethology/animal behaviour) and 4% (38 thousand) were undertaken for other purposes. As Figure 11 shows, of the 1.04 million procedures carried out for basic research purposes, the three most common purposes were:

- targeted at the nervous system (23% or 235 thousand procedures);
- targeted at the immune system (22% or 224 thousand procedures);
- for oncology (13% or 133 thousand procedures).

Figure 11: Procedures undertaken for basic research, by sub-purpose, 2014



Translational/applied research

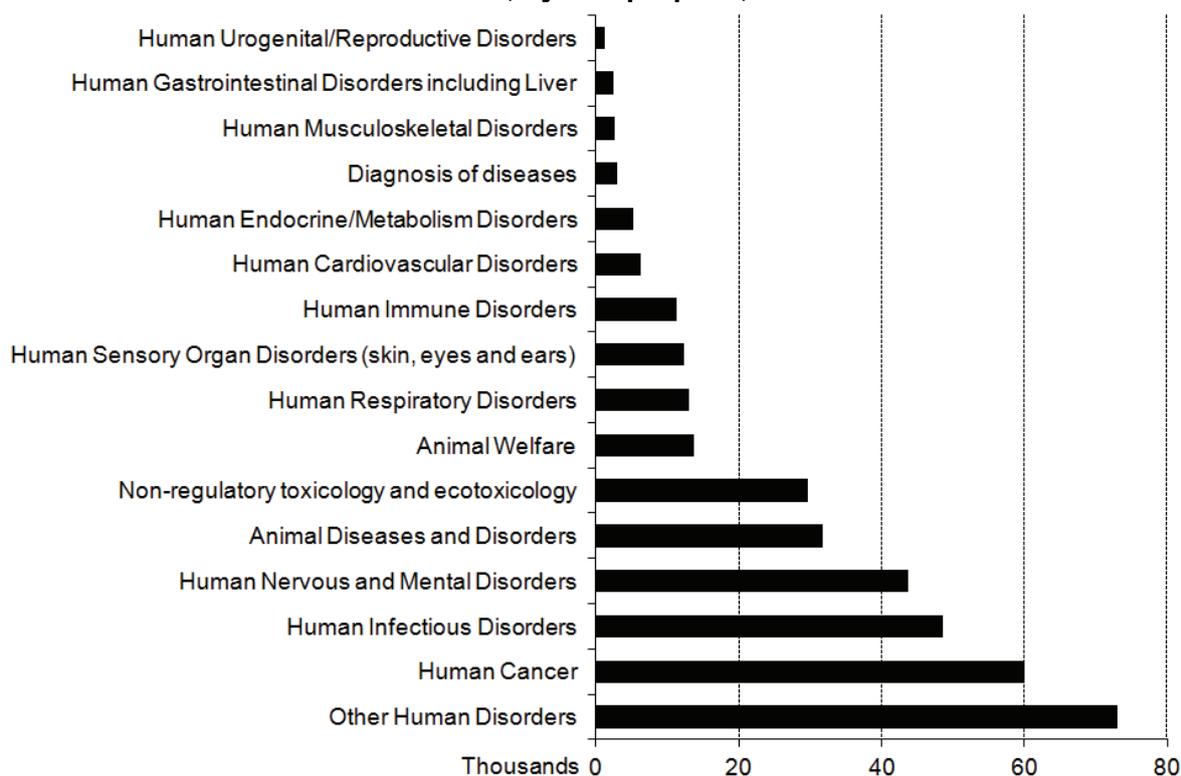
(Table 6)

In 2014, 358 thousand procedures were undertaken for translational/applied research purposes. Of those, 78% (280 thousand procedures) were undertaken for research on humans, 13% (46 thousand procedures) were undertaken for animal research, 8% (30 thousand procedures) were undertaken for non-regulatory/ecotoxicology and 0.8% (3,000) were undertaken for the diagnosis of diseases. As Figure 12 shows, of the 358 thousand procedures undertaken for translational and applied research, the three most common research purposes were:

- human cancer (17% or 60 thousand procedures);
- human infectious disorders (14% or 49 thousand procedures);
- human nervous and mental disorders (12% or 44 thousand procedures).

Due to changes in the categorisation of procedures in 2014, many of the procedures previously reported under applied studies are now collected under regulatory use, and therefore comparison with previous years is not possible.

Figure 12: Procedures undertaken for translational/applied research, by sub-purpose, 2014



Regulatory use

(Tables 7.1-7.4)

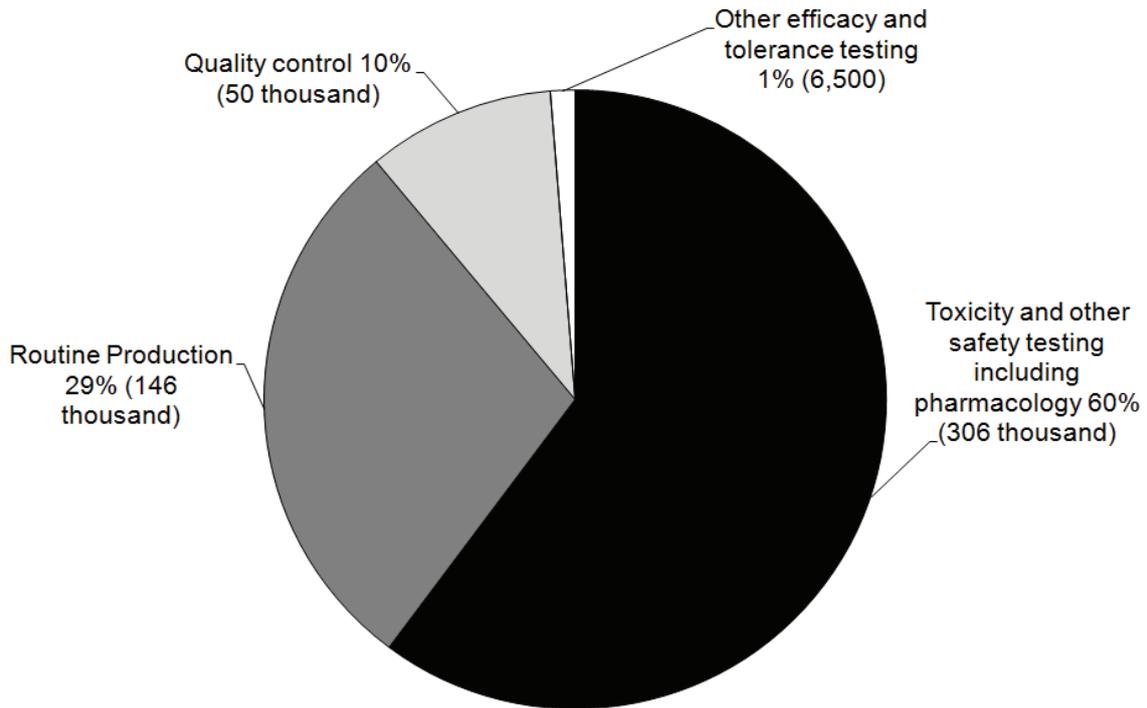
This category includes all procedures carried out to satisfy legal requirements including the production of substances to legal specification, such as material for diagnostic tests (e.g. blood products), studies to evaluate the safety or effectiveness of pharmaceuticals and studies to evaluate the safety of other chemicals.

In 2014, 508 thousand procedures were undertaken for regulatory use. Of those, as Figure 13 shows:

- 60% (306 thousand) were for toxicity and other safety testing including pharmacology and, of those:
 - acute and sub-acute toxicity testing methods accounted for 144 thousand procedures (28% of all procedures undertaken for regulatory purposes);
 - ecotoxicity³² accounted for 13 thousand procedures (3% of all procedures undertaken for regulatory purposes);
- 29% (146 thousand) were for routine production of e.g. vaccines and diagnostic reagents;
- 10% (50 thousand) were for the quality control of marketed medicines.

³² Ecotoxicity studies in animals relate to toxicity studies that are legislatively required to demonstrate the environmental safety of a substance.

Figure 13: Regulatory use procedures by type, 2014



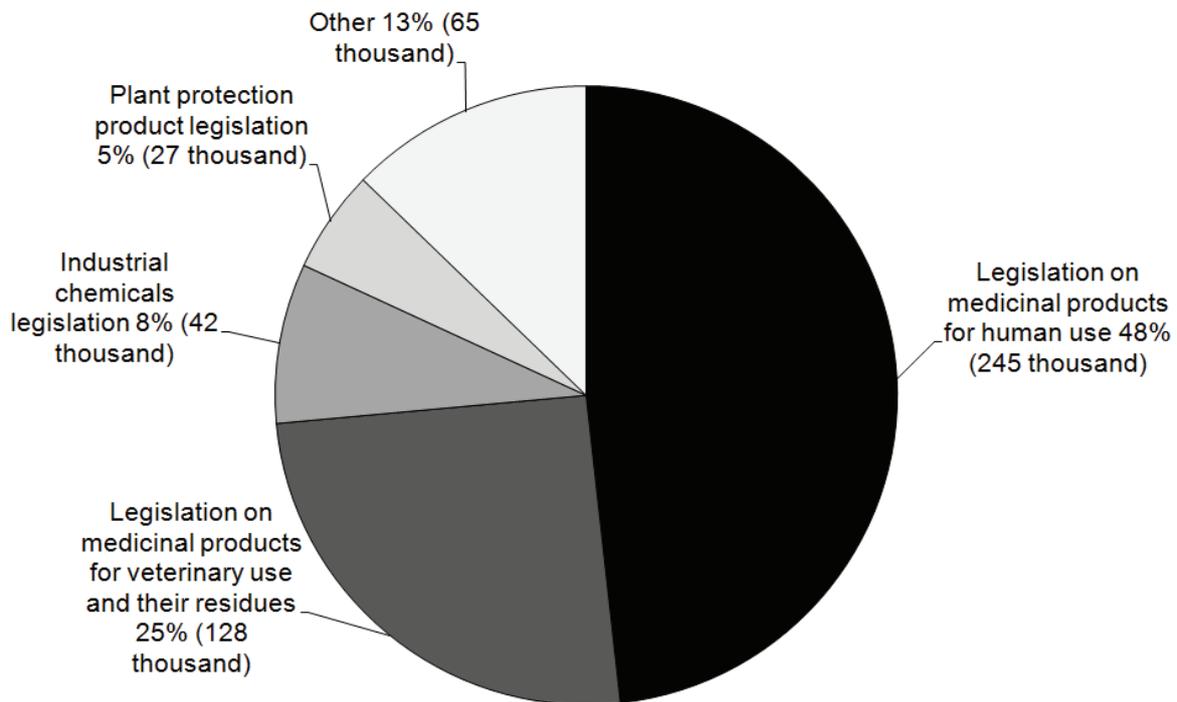
Legislative requirements

(Table 7.2)

In 2014, of the 508 thousand procedures undertaken for regulatory testing, as Figure 14 shows:

- 48% (245 thousand) involved legislation on medicinal products for human use;
- 25% (128 thousand) involved legislation on medicinal products for veterinary use (and their residues);
- 8% (42 thousand) involved industrial chemicals legislation;
- 5% (27 thousand) involved plant protection product legislation.

Figure 14: Regulatory procedures by legislation, 2014



Origin of legislative requirement
(Table 7.3)

In 2014, of the 508 thousand procedures undertaken for regulatory testing:

- 95% (483 thousand) satisfied both UK and EU legislative requirements;
- 0.2% (1,200) satisfied just UK legislative requirements;
- 5% (23 thousand) satisfied non-EU legislative requirements.

Creation/breeding of genetically altered animals
(Tables 1, 8-10)

The creation/breeding of genetically altered animals includes the use of animals for the creation of new lines of genetically altered animals and the breeding of established lines of genetically altered animals that were not used in further regulated procedures. This category also includes some animals which were bred with the intention of producing genetically altered animals, but resulted in non-genetically altered animals being born (9% of animals in this category or 182 thousand animals). 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.

In 2014, 1.94 million genetically altered animals were created/bred but not used in further procedures, accounting for 50% of the total procedures in 2014. Of the 1.94 million genetically altered animals created/bred, nearly all involved mice (91% or 1.76 million procedures), zebrafish (8% or 154 thousand procedures) and rats (1% or 20 thousand procedures).

Whilst comparisons with previous years' data should be made with some caution (see introductory notes, data quality section), comparing 2014 figures with 2013, the creation/breeding of genetically altered animals represents a decrease of 8% (-162 thousand) procedures. In addition, the change to counting when a procedure is completed means that genetically altered animals not used in further procedures are now counted when they are killed. For this reason many animals created/bred in 2014 will not have been included in the 2014 statistics, making comparisons with 2013 data more difficult, as these figures counted animals when born.

Some project licence holders provided information under the creation of new lines of genetically altered animals when it should have been reported as being under the breeding of established lines of genetically altered animals. This issue will only have affected the breakdowns for the creation/breeding of genetically altered animals and not any totals.

Creation of new lines of genetically altered animals

(Tables 9.1-9.3)

Of the 1.94 million genetically altered animals created/bred but not used in further procedures in 2014, 18% (354 thousand) were for the creation of new lines of genetically altered animals. This category includes the initial stages of creation of a novel transgenic³³ or mutant³⁴ line of animal until that line becomes established. Of the 354 thousand animals used in 2014 to create new lines of genetically altered animals:

- 99% (351 thousand) were for basic research purposes;
- 1% (3,200) were for translation and applied studies.

Maintenance of established lines of genetically altered animals

(Table 10)

Of the 1.94 million genetically altered animals created/bred but not used in further procedures in 2014, 1.59 million (82%) were for the maintenance of established lines of genetically altered animals. These are lines of genetically altered animals that are stably transmitted (i.e. where the genetic trait is transmitted to offspring in the expected proportion and with the expected severity) and have been bred for at least two generations. Of the 1.59 million animals bred in 2014 for the maintenance of established lines of genetically altered animals:

- 76% (1.20 million) were genetically altered but did not have a harmful phenotype;
- 18% (282 thousand) were genetically altered and did have a harmful phenotype;
- 7% (105 thousand) were not genetically altered and were, for example, wild type offspring of heterozygous parents.

³³ A transgenic animal or strain is one containing novel genes that have been inserted by laboratory manipulation.

³⁴ A mutant animal or strain is one where the genes of the animal have either naturally mutated or have been induced to change by the application of a chemical or other mutation-inducing substance.

Techniques of specific interest

Information on specific techniques, where the Home Office has policies related to these areas, was also collected:

- 170 procedures involved using mice to research the effects of alcohol on brain development;
- 140 procedures involved using fish (specifically rainbow trout) for the testing of a household product ingredient required under REACH³⁵;
- no animals were used for the production of monoclonal antibodies from ascetic fluid, the testing of tobacco products and for the testing of cosmetics.

Use of neuromuscular blocking agents and anaesthesia

The use of neuromuscular blocking agents (NMBA)³⁶ was recorded in 19 returns (out of 3,134). Of these, 17 returns indicated using anaesthesia³⁷ and 2 returns did not. The nature of the experiments conducted using NMBA without anaesthesia meant that, at the time, the animals were not expected to experience pain.

Rodenticide trials

It is impracticable to collect accurate figures on the number of animals used in field trials of rodenticide³⁸ substances. Nonetheless, three returns (out of 3,134) indicated that such field trials occurred in 2014.

Use of animals of endangered species

Returns were required on the use of animals listed in Annex A of European Council Regulation (EC) No 338/97 and not within the scope of Article 7(1) of that Regulation. Four returns (out of 3,134) indicated using animals in this category in 2014; these involved wild birds and fish in research relevant to those species.

International comparisons

Northern Ireland collects figures on the same basis as Great Britain. These are published separately by the Department of Health, Social Services and Public Safety, Northern Ireland.³⁹

Previously, data compiled by EU countries and submitted to the European Commission used a narrower, but common, definition of animal experiments. The main differences between the EU's and the UK's figures were that the EU's figures were based on the numbers of animals used, not on the numbers of procedures, and excluded the creation/breeding of genetically altered animals. However, for data relating to 2014 onwards, following the new European

³⁵ REACH is an EU regulation concerning the registration, evaluation, authorisation and restriction of chemicals.

³⁶ Neuromuscular blocking agents relax skeletal muscles and induce paralysis.

³⁷ Local or general anaesthesia, with the latter rendering an animal unconscious.

³⁸ 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 safety and efficacy aspects of their use.

³⁹ See: <http://www.dhsspsni.gov.uk/healthprotection-animalscience>.

Directive (see introductory notes, changes to the data collection section) other EU countries have now begun including the creation/breeding of some genetically animals in their figures.

The latest EU-wide data,⁴⁰ based on the previous narrower definition, are for 2011 and some of the key points are as follows:

- The total number of animals used for experimental and other scientific purposes in 2011 (with one Member State reporting for 2010) was 11.48 million. This represents a reduction of over one-half a million animals used in the EU from the number reported in 2008.
- Rodents and rabbits represent 80% of the total number of animals used in the EU. Mice are the most commonly used animal species, accounting for 61% of the total use, followed by rats, at 14%.
- No great apes have been used in the EU since 1999. Furthermore, there has been a substantial decrease in the use of non-human primates.

Returns, project licences, establishment licences, and personal licences

(Table 11)

Statistical returns are required each year for every project licence in force for part or all of the year. For data relating to 2014, returns were provided under 3,134 project licences, 100% of those in force for part or all of the year. Of the 3,134 project licences:

- procedures were completed under 2,480 project licences (2,467 covered countable procedures and 13 covered only non-countable procedures);
- no procedures were completed under 654 project licences.

There were 2,608 project licences in force at the end of 2014 compared with 2,672 at the end of 2013. There were 173 establishment licences in force authorising places where work was carried out at the end of 2014 compared with 174 establishment licences at the end of 2013.

The Home Office is in the process of moving from a paper-based licensing system to an electronic based one. Because of this, it has not been possible to identify the exact number of personal licences in force at the end of December 2014. It is expected in 2016 that it will possible to identify the number of personal licences held once the conversion to the electronic based licensing system has been completed. Nonetheless, at the end of December 2013, 16,112 active personal licences were in force.

⁴⁰ Seventh report from the Commission to the Council and the European Parliament on the statistics on the number of animals used for experimental and other scientific purposes in the Member States of the European Union COM(2013)859/final, available at: http://ec.europa.eu/environment/chemicals/lab_animals/reports_en.htm.

Further information

Information about research and testing using animals can be found at:

<https://www.gov.uk/research-and-testing-using-animals>.

Information about the Animals in Science Committee can be found at:

<https://www.gov.uk/government/organisations/animals-in-science-committee>.

Information about the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) can be found at:

<http://www.nc3rs.org.uk/>.

Information relating to Northern Ireland is published by the Department of Health, Social Services and Public Safety and can be found at:

<http://www.dhsspsni.gov.uk/healthprotection-animalscience>.

Tables

Organisation chart

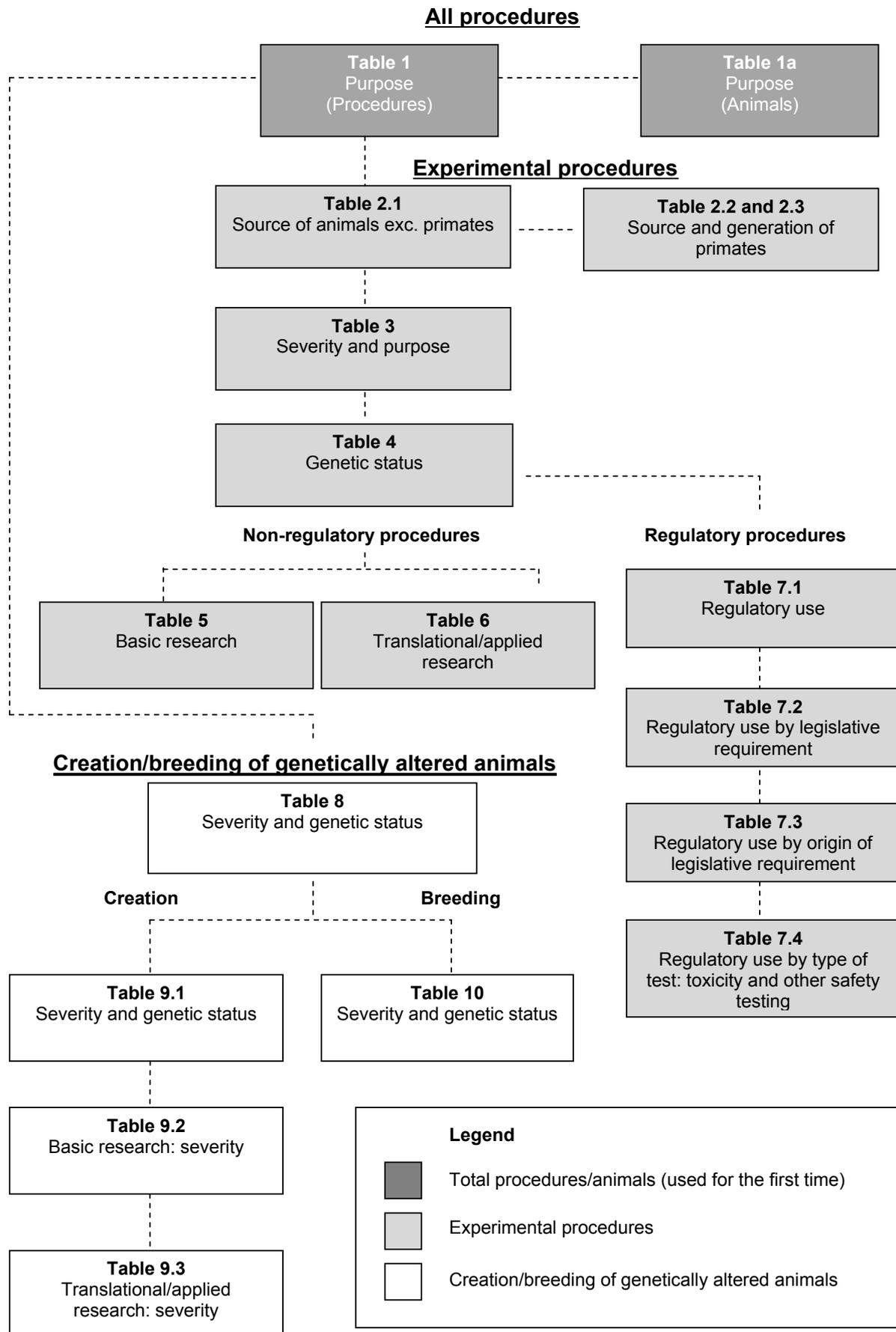


Table 1 Procedures by species of animal and purpose of the procedure

Species of animal	Experimental purpose of procedure (excluding creation & breeding)										Number of procedures		
	Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	Total experimental procedures	Creation & breeding of genetically altered animals not used in experimental procedures	Total procedures	% of total procedures	Number of procedures	
Mammal													
Mouse (<i>Mus musculus</i>)	741,307	226,822	1,082	0	0	694	188,950	1,158,855	1,762,022	2,920,877	76		
Rat (<i>Rattus norvegicus</i>)	72,892	45,997	1,912	0	0	792	111,953	233,546	20,140	253,686	7		
Guinea-pig (<i>Cavia porcellus</i>)	1,727	18,076	0	0	0	97	7,127	27,027	0	27,027	0.7		
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	420	1,017	0	0	0	0	1,348	2,785	0	2,785	0.1		
Hamster (Chinese) (<i>Cricetus griseus</i>)	0	0	0	0	0	0	0	0	0	0	0		
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	255	146	0	0	0	0	0	401	0	401	0.01		
Other rodent (other <i>Rodentia</i>)	2,651	167	25	0	0	0	272	3,115	0	3,115	0.1		
Rabbit (<i>Oryctolagus cuniculus</i>)	1,686	2,707	0	0	0	13	9,470	13,876	0	13,876	0.4		
Cat (<i>Felis catus</i>)	17	171	0	22	0	0	0	210	0	210	0.01		
Dog (<i>Canis familiaris</i>)	122	551	0	0	0	0	3,434	4,107	0	4,107	0.1		
Ferret (<i>Mustela putorius furo</i>)	79	403	0	0	0	14	0	496	0	496	0.01		
Other carnivore (other <i>Carnivora</i>)	95	113	177	0	0	0	0	385	0	385	0.01		
Horse and other equids (<i>Equidae</i>)	138	22	0	0	0	0	7,899	8,079	0	8,079	0.2		
Pig (<i>Sus scrofa domestica</i>)	822	1,133	304	0	0	4	1,232	3,495	370	3,865	0.1		
Goat (<i>Capra aegagrus hircus</i>)	8	280	0	0	0	0	56	344	0	344	0.01		
Sheep (<i>Ovis aries</i>)	4,899	1,770	0	0	0	0	36,866	43,535	106	43,641	1		
Cattle (<i>Bos primigenius</i>)	1,120	2,656	0	0	0	0	1,699	5,475	0	5,475	0.1		
Primate													
New World monkey	128	0	0	0	0	0	0	128	0	128	0.003		
Marmoset and tamarin													
Old World monkey	30	192	0	0	0	0	2,732	2,954	0	2,954	0.1		
Cynomolgus monkey (<i>Macaca fascicularis</i>)	111	34	0	0	0	0	19	164	0	164	0.004		
Rhesus monkey (<i>Macaca mulatta</i>)													
Other mammal (other <i>Mammalia</i>)	386	1	69	0	0	0	38	494	0	494	0.01		
Bird													
Domestic fowl (<i>Gallus domesticus</i>)	5,882	8,422	0	0	0	0	115,371	129,675	798	130,473	3		
Other bird (other <i>Aves</i>)	3,920	1,692	1,049	183	0	0	2,165	9,009	0	9,009	0.2		
Reptile (Reptilia)	0	0	0	0	0	0	0	0	0	0	0		
Amphibia													
Rana (<i>Temporaria and Pipiens</i>)	0	0	1,866	0	0	0	0	1,866	0	1,866	0.05		
Xenopus (<i>Xenopus laevis and Tropicalis</i>)	9,404	0	0	0	0	0	0	9,404	3,953	13,357	0.3		
Other amphibian (other <i>Amphibia</i>)	625	56	979	0	0	0	0	1,660	0	1,660	0.04		
Fish													
Zebrafish (<i>Danio rerio</i>)	115,923	14,232	200	0	0	0	882	131,237	154,460	285,697	7		
Other fish (other <i>Pisces</i>)	75,351	31,698	8,809	1,120	0	200	16,083	133,261	7	133,268	3		
Cephalopod (Cephalopoda)	0	0	0	0	0	0	0	0	0	0	0		
Total	1,039,998	358,358	16,472	1,325	0.03	1,814	507,596	1,925,583	1,941,856	3,867,439	100		
% of total	27	9	0.4	0.03	0.05	0.001	13	50	50	100			

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

Species of animal	Experimental purpose of procedure (excluding creation & breeding)										Number of animals	
	Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	Total experimental procedures	Creation & breeding of genetically altered animals not used in experimental procedures	Total procedures	% of total procedures	
Mammal												
Mouse (<i>Mus musculus</i>)	736,293	225,739	1,082	0	587	0	188,863	1,152,564	1,761,725	2,914,289	77	
Rat (<i>Rattus norvegicus</i>)	71,698	45,548	1,912	0	792	0	111,364	231,314	20,140	251,454	7	
Guinea-pig (<i>Cavia porcellus</i>)	1,727	18,076	0	0	97	0	7,127	27,027	0	27,027	0.7	
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	420	1,017	0	0	0	0	1,348	2,785	0	2,785	0.1	
Hamster (Chinese) (<i>Cricetus griseus</i>)	0	0	0	0	0	0	0	0	0	0	0	
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	255	146	0	0	0	0	0	401	0	401	0.01	
Other rodent (other <i>Rodentia</i>)	2,651	167	25	0	0	0	272	3,115	0	3,115	0.1	
Rabbit (<i>Oryctolagus cuniculus</i>)	1,339	2,693	0	0	2	0	7,513	11,547	0	11,547	0.3	
Cat (<i>Felis catus</i>)	11	151	0	22	0	0	0	184	0	184	0.005	
Dog (<i>Canis familiaris</i>)	9	128	0	0	0	0	2,605	2,742	0	2,742	0.1	
Ferret (<i>Mustela putorius furo</i>)	79	402	0	0	14	0	0	495	0	495	0.01	
Other carnivore (other <i>Carnivora</i>)	95	113	177	0	0	0	0	385	0	385	0.01	
Horse and other equids (<i>Equidae</i>)	36	15	0	0	0	0	136	187	0	187	0.005	
Pig (<i>Sus scrofa domestica</i>)	822	1,049	304	0	4	0	1,185	3,364	370	3,734	0.1	
Goat (<i>Capra aegagrus hircus</i>)	8	280	0	0	0	0	56	344	0	344	0.01	
Sheep (<i>Ovis aries</i>)	4,161	1,318	0	0	0	0	526	6,005	106	6,111	0.2	
Cattle (<i>Bos primigenius</i>)	1,044	2,582	0	0	0	0	1,658	5,284	0	5,284	0.1	
Primate												
New World monkey	100	0	0	0	0	0	0	100	0	100	0.003	
Marmoset and tamarin												
Old World monkey	2	142	0	0	0	0	2,118	2,262	0	2,262	0.1	
Cynomolgus monkey (<i>Macaca fascicularis</i>)	55	30	0	0	0	0	19	104	0	104	0.003	
Rhesus monkey (<i>Macaca mulatta</i>)												
Other mammal (other <i>Mammalia</i>)	386	1	69	0	0	0	2	458	0	458	0.01	
Bird												
Domestic fowl (<i>Gallus domesticus</i>)	5,881	8,411	0	0	0	0	115,371	129,663	798	130,461	3	
Other bird (other <i>Aves</i>)	3,835	1,646	1,049	183	0	0	2,146	8,859	0	8,859	0.2	
Reptile (Reptilia)	0	0	0	0	0	0	0	0	0	0	0	
Amphibia												
Rana (<i>Temporaria and Pipiens</i>)	0	0	1,866	0	0	0	0	1,866	0	1,866	0.05	
Xenopus (<i>Xenopus laevis and Tropicalis</i>)	4,526	0	0	0	0	0	0	4,526	3,581	8,107	0.2	
Other amphibian (other <i>Amphibia</i>)	625	56	979	0	0	0	0	1,660	0	1,660	0.04	
Fish												
Zebra fish (<i>Danio rerio</i>)	115,813	14,232	200	0	0	0	882	131,127	152,532	283,659	7	
Other fish (other <i>Pisces</i>)	74,666	31,698	8,809	1,120	200	0	16,083	132,576	7	132,583	3	
Cephalopod (Cephalopoda)	0	0	0	0	0	0	0	0	0	0	0	
Total	1,028,537	355,640	16,472	1,325	1,696	0	459,274	1,860,944	1,939,259	3,800,203	100	
% of total	27	9	0.4	0.03	0.04	0	12	49	51	100		

Table 2.1 Source of animals used for the first time in experimental procedures by species of animal (excludes non-human primates) ¹

Species of animal	Source of animal						Total	Number of animals % of total
	Animals born in the UK at a registered breeder		Animals born in the EU but not at a registered breeder		Animals born in the rest of the world			
	Animals born in the UK at a registered breeder	Animals born in the EU but not at a registered breeder	Animals born in the EU but not at a registered breeder	Animals born in the rest of Europe	Animals born in the rest of the world			
Mammal								
Mouse (<i>Mus musculus</i>)*	1,126,291	0	17,379	973	613	7,308	1,152,564	62
Rat (<i>Rattus norvegicus</i>)*	222,523	158	7,893	0	0	740	231,314	12
Guinea-pig (<i>Cavia porcellus</i>)*	26,961	0	66	0	0	0	27,027	1
Hamster (Syrian) (<i>Mesocricetus auratus</i>)*	1,097	0	1,544	0	0	144	2,785	0.1
Hamster (Chinese) (<i>Cricetulus griseus</i>)*	0	0	0	0	0	0	0	0
Mongolian Gerbil (<i>Meriones unguiculatus</i>)*	169	0	225	0	0	7	401	0.02
Other rodent (other <i>Rodentia</i>)	745	2,260	0	0	0	110	3,115	0.2
Rabbit (<i>Oryctolagus cuniculus</i>)*	8,722	0	1,550	4	0	1,271	11,547	0.6
Cat (<i>Felis catus</i>)*	5	0	100	79	0	0	184	0.01
Dog (<i>Canis familiaris</i>)*	1,768	11	285	26	12	640	2,742	0.1
Ferret (<i>Mustela putorius furo</i>)*	440	0	1	0	0	54	495	0.03
Other carnivore (other <i>Carnivora</i>)	0	211	0	174	0	0	385	0.02
Horse and other equids (<i>Equidae</i>)	30	154	0	3	0	0	187	0.01
Pig (<i>Sus scrofa domestica</i>)*	401	2,575	350	38	0	0	3,364	0.2
Goat (<i>Capra aegagrus hircus</i>)	0	344	0	0	0	0	344	0.02
Sheep (<i>Ovis aries</i>)*	1,197	4,760	42	0	0	6	6,005	0.3
Cattle (<i>Bos primigenius</i>)	1,947	2,919	0	418	0	0	5,284	0.3
Other mammal (other <i>Mammalia</i>)	29	429	0	0	0	0	458	0.02
Bird								
Domestic fowl (<i>Gallus domesticus</i>)	10,576	118,860	0	227	0	0	129,663	7
Other bird (other <i>Aves</i>)	659	7,537	0	624	39	0	8,859	0.5
Reptile (<i>Reptilia</i>)	0	0	0	0	0	0	0	0
Amphibia								
Rana (<i>Temporaria and Pipiens</i>)*	0	1,866	0	0	0	0	1,866	0.1
Xenopus (<i>Laevis and Tropicalis</i>)*	3,869	0	0	221	0	436	4,526	0.2
Other amphibian (other <i>Amphibia</i>)	0	1,238	0	70	0	352	1,660	0.1
Fish								
Zebrafish (<i>Danio rerio</i>)*	128,285	0	415	0	0	2,427	131,127	7
Other fish (other <i>Pisces</i>)	17,899	112,350	180	1,047	0	1,100	132,576	7
Cephalopod (<i>Cephalopoda</i>)	0	0	0	0	0	0	0	0
Total	1,553,613	255,672	30,030	3,904	664	14,595	1,858,478	100
% of total	84	14	2	0.2	0.04	0.8	100	

1. This table differs from the previous publications as it shows the place of birth (i.e. source) of all animals and not just those species listed in Schedule 2 of the Animals (Scientific Procedures) Act 1986.
* Denotes species listed in Schedule 2 if they are genetically altered.

Table 2.2 Source of non-human primates¹ used for the first time in experimental procedures by species of primate

Species of primate	Source						Number of animals	
	Animals born within the EU at a registered breeder	Animals born in the rest of Europe	Animals born in Asia	Animals born in America	Animals born in Africa	Animals born elsewhere	Total	% of total
Primate								
New World monkey	100	0	0	0	0	0	100	4
Marmoset and tamarin								
Old World monkey	222	0	697	0	1,343	0	2,262	92
Cynomolgus monkey (<i>Macaca fascicularis</i>)	85	0	19	0	0	0	104	4
Rhesus monkey (<i>Macaca mulatta</i>)								
Total	407	0	716	0	1,343	0	2,466	100
% of total	17	0	29	0	54	0	100	100

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

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

Species of primate	Generation				Number of animals	
	F0	F1	F2 or greater	Self-sustaining colony	Total	% of total
Primate						
New World monkey	0	0	20	80	100	4
Marmoset and tamarin						
Old World monkey	0	0	648	1,614	2,262	92
Cynomolgus monkey (<i>Macaca fascicularis</i>)	0	0	24	80	104	4
Rhesus monkey (<i>Macaca mulatta</i>)						
Total	0	0	692	1,774	2,466	100
% of total	0	0	28	72	100	100

Table 3 Experimental procedures by species of animal, severity and purpose of the procedure¹, page 1 of 2

Great Britain 2014		Experimental purpose of procedure							Number of procedures	
Species of animal	Actual Severity	Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory	Total	% of total
Mouse	Sub threshold	93,735	5,893	4	0	0	0	259	99,891	9
	Non-recovery	43,873	37,517	0	0	114	0	399	81,903	7
	Mild	345,690	92,102	827	0	566	0	49,411	488,596	42
	Moderate	240,155	85,560	47	0	10	0	42,859	368,631	32
	Severe	17,854	5,750	204	0	4	0	96,022	119,834	10
	Total	741,307	226,822	1,082	0	694	0	188,950	1,158,855	100
Rat	Sub threshold	2,673	171	287	0	0	0	18,623	21,754	9
	Non-recovery	14,534	10,851	0	0	667	0	1,059	27,111	12
	Mild	19,411	16,508	481	0	121	0	76,233	112,754	48
	Moderate	33,758	18,277	36	0	4	0	13,960	66,035	28
	Severe	2,516	190	1,108	0	0	0	2,078	5,892	3
	Total	72,892	45,997	1,912	0	792	0	111,953	233,546	100
Guinea-pigs	Sub threshold	59	9	0	0	0	0	0	68	0.3
	Non-recovery	601	16,967	0	0	78	0	32	17,678	65
	Mild	681	637	0	0	19	0	2,662	3,999	15
	Moderate	383	231	0	0	0	0	1,924	2,538	9
	Severe	3	232	0	0	0	0	2,509	2,744	10
	Total	1,727	18,076	0	0	97	0	7,127	27,027	100
Other rodents	Sub threshold	0	61	19	0	0	0	10	90	1
	Non-recovery	85	0	0	0	0	0	30	115	2
	Mild	885	594	1	0	0	0	502	1,982	31
	Moderate	2,297	506	0	0	0	0	923	3,726	59
	Severe	59	169	5	0	0	0	155	388	6
	Total	3,326	1,330	25	0	0	0	1,620	6,301	100
Rabbits	Sub threshold	0	0	0	0	0	0	0	0	0
	Non-recovery	361	1,955	0	0	2	0	57	2,375	17
	Mild	887	462	0	0	11	0	8,238	9,598	69
	Moderate	430	259	0	0	0	0	1,142	1,831	13
	Severe	8	31	0	0	0	0	33	72	0.5
	Total	1,686	2,707	0	0	13	0	9,470	13,876	100
Cats	Sub threshold	0	0	0	0	0	0	0	0	0
	Non-recovery	0	0	0	0	0	0	0	0	0
	Mild	17	126	0	22	0	0	0	165	79
	Moderate	0	38	0	0	0	0	0	38	18
	Severe	0	7	0	0	0	0	0	7	3
	Total	17	171	0	22	0	0	0	210	100
Dogs	Sub threshold	0	0	0	0	0	0	26	26	0.6
	Non-recovery	0	216	0	0	0	0	32	248	6
	Mild	122	306	0	0	0	0	2,589	3,017	73
	Moderate	0	29	0	0	0	0	774	803	20
	Severe	0	0	0	0	0	0	13	13	0.3
	Total	122	551	0	0	0	0	3,434	4,107	100
Ferrets	Sub threshold	0	0	0	0	0	0	0	0	0
	Non-recovery	27	0	0	0	14	0	0	41	8
	Mild	26	300	0	0	0	0	0	326	66
	Moderate	25	101	0	0	0	0	0	126	25
	Severe	1	2	0	0	0	0	0	3	0.6
	Total	79	403	0	0	14	0	0	496	100
Horses	Sub threshold	7	0	0	0	0	0	0	7	0.1
	Non-recovery	0	0	0	0	0	0	0	0	0
	Mild	131	19	0	0	0	18	7,899	8,067	100
	Moderate	0	3	0	0	0	2	0	5	0.1
	Severe	0	0	0	0	0	0	0	0	0
	Total	138	22	0	0	0	20	7,899	8,079	100
Pigs	Sub threshold	0	106	0	0	0	0	22	128	4
	Non-recovery	291	154	0	0	4	0	16	465	13
	Mild	293	806	304	0	0	0	895	2,298	66
	Moderate	214	67	0	0	0	0	295	576	16
	Severe	24	0	0	0	0	0	4	28	0.8
	Total	822	1,133	304	0	4	0	1,232	3,495	100
All other Ungulates	Sub threshold	5	10	0	0	0	0	0	15	0.03
	Non-recovery	21	6	0	0	0	0	0	27	0.1
	Mild	5,536	4,274	0	0	0	0	38,015	47,825	97
	Moderate	451	414	0	0	0	0	593	1,458	3
	Severe	14	2	0	0	0	0	13	29	0.1
	Total	6,027	4,706	0	0	0	0	38,621	49,354	100

1. No procedures were completed in 2014 on reptiles and cephalopods. Therefore, these species are not listed in this table.

Table 3 Experimental procedures by species of animal, severity and purpose of the procedure¹, page 2 of 2

Great Britain 2014		Number of procedures								
Species of animal	Actual Severity	Experimental purpose of procedure							Total	% of total
		Basic Research	Translational/ Applied research	Protection of the natural environment	Preservation of species	Higher education or training	Forensic enquiries	Regulatory		
Other mammals	Sub threshold	8	0	0	0	0	0	0	8	0.9
	Non-recovery	1	0	0	0	0	0	0	1	0.1
	Mild	449	114	246	0	0	0	2	811	92
	Moderate	21	0	0	0	0	0	36	57	6
	Severe	2	0	0	0	0	0	0	2	0
	Total	481	114	246	0	0	0	38	879	100
Primates	Sub threshold	0	0	0	0	0	0	0	0	0
	Non-recovery	10	0	0	0	0	0	9	19	0.6
	Mild	130	189	0	0	0	0	2,193	2,512	77
	Moderate	124	27	0	0	0	0	548	699	22
	Severe	5	10	0	0	0	0	1	16	0.5
	Total	269	226	0	0	0	0	2,751	3,246	100
Birds	Sub threshold	22	1,961	0	0	0	0	2,197	4,180	3
	Non-recovery	0	215	0	0	0	0	907	1,122	0.8
	Mild	9,227	6,302	1,017	183	0	0	111,708	128,437	93
	Moderate	527	443	32	0	0	0	2,384	3,386	2
	Severe	26	1,193	0	0	0	0	340	1,559	1
	Total	9,802	10,114	1,049	183	0	0	117,536	138,684	100
Amphibians	Sub threshold	527	0	0	0	0	0	0	527	4
	Non-recovery	14	0	0	0	0	0	0	14	0.1
	Mild	8,666	0	0	0	0	0	0	8,666	67
	Moderate	783	56	0	0	0	0	0	839	6
	Severe	39	0	2,845	0	0	0	0	2,884	22
	Total	10,029	56	2,845	0	0	0	0	12,930	100
Fish	Sub threshold	48,909	804	364	0	0	0	3,350	53,427	20
	Non-recovery	1,448	2	1	0	200	0	0	1,651	0.6
	Mild	119,213	25,536	7,704	264	0	0	7,743	160,460	61
	Moderate	17,063	11,169	933	856	0	0	2,493	32,514	12
	Severe	4,641	8,419	7	0	0	0	3,379	16,446	6
	Total	191,274	45,930	9,009	1,120	200	0	16,965	264,498	100
All species	Sub threshold	145,945	9,015	674	0	0	0	24,487	180,121	9
	Non-recovery	61,266	67,883	1	0	1,079	0	2,541	132,770	7
	Mild	511,364	148,275	10,580	469	717	18	308,090	979,513	51
	Moderate	296,231	117,180	1,048	856	14	2	67,931	483,262	25
	Severe	25,192	16,005	4,169	0	4	0	104,547	149,917	8
	Total	1,039,998	358,358	16,472	1,325	1,814	20	507,596	1,925,583	100

1. No procedures were completed in 2014 on reptiles and cephalopods. Therefore, these species are not listed in this table.

Table 4 Experimental procedures by species of animal and genetic status

Species of animal	Genetic status			Number of procedures	
	Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype	Total	% of total
Mammal					
Mouse (<i>Mus musculus</i>)	637,007	407,452	114,396	1,158,855	60
Rat (<i>Rattus norvegicus</i>)	226,704	5,008	1,834	233,546	12
Guinea-pig (<i>Cavia porcellus</i>)	27,027	0	0	27,027	1
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	2,785	0	0	2,785	0.1
Hamster (Chinese) (<i>Cricetulus griseus</i>)	0	0	0	0	0
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	401	0	0	401	0.02
Other rodent (<i>other Rodentia</i>)	3,115	0	0	3,115	0.2
Rabbit (<i>Oryctolagus cuniculus</i>)	13,876	0	0	13,876	0.7
Cat (<i>Felis catus</i>)	210	0	0	210	0.01
Dog (<i>Canis familiaris</i>)	4,105	0	2	4,107	0.2
Ferret (<i>Mustela putorius furo</i>)	496	0	0	496	0.03
Other carnivore (<i>other Carnivora</i>)	385	0	0	385	0.02
Horse and other equids (<i>Equidae</i>)	8,079	0	0	8,079	0.4
Pig (<i>Sus scrofa domesticus</i>)	3,456	39	0	3,495	0.2
Goat (<i>Capra aegagrus hircus</i>)	344	0	0	344	0.02
Sheep (<i>Ovis aries</i>)	43,515	14	6	43,535	2
Cattle (<i>Bos primigenius</i>)	5,475	0	0	5,475	0.3
Primate					
New World monkey					
Marmoset and tamarin	128	0	0	128	0.01
Old World monkey					
Cynomolgus monkey (<i>Macaca fascicularis</i>)	2,954	0	0	2,954	0.2
Rhesus monkey (<i>Macaca mulatta</i>)	164	0	0	164	0.01
Other mammal (<i>other Mammalia</i>)	494	0	0	494	0.03
Bird					
Domestic fowl (<i>Gallus domesticus</i>)	129,652	0	23	129,675	6.7
Other bird (<i>other Aves</i>)	9,009	0	0	9,009	0.5
Reptile (<i>Reptilia</i>)	0	0	0	0	0
Amphibia					
Rana (<i>Temporaria and Pipiens</i>)	1,866	0	0	1,866	0.1
Xenopus (<i>Laevis and Tropicalis</i>)	6,881	2,523	0	9,404	0.5
Other amphibian (<i>other Amphibia</i>)	1,660	0	0	1,660	0.1
Fish					
Zebrafish (<i>Danio rerio</i>)	44,734	83,070	3,433	131,237	7
Other fish (<i>other Pisces</i>)	132,672	589	0	133,261	7
Cephalopod (<i>Cephalopoda</i>)	0	0	0	0	0
Total	1,307,194	498,695	119,694	1,925,583	100
% of total	68	26	6	100	

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

Species of animal	Translational/applied research											Number of procedures			
	Human Cancer	Human Infectious Disorders	Human Cardiovascular Disorders	Human Nervous and Mental Disorders	Human Respiratory Disorders	Human Gastrointestinal Disorders including Liver	Human Musculoskeletal Disorders	Human Immune Disorders	Human Urogenital/Reproductive Disorders						
Mammal															
Mouse (<i>Mus musculus</i>)	58,860	42,640	4,352	30,468	10,807	2,211	1,817	9,249	1,088						
Rat (<i>Rattus norvegicus</i>)	1,188	3,284	1,732	11,980	1,878	321	551	2,099	89						
Guinea-pig (<i>Cavia porcellus</i>)	0	566	0	0	224	0	0	0	12						
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	0	1,017	0	0	0	0	0	0	0						
Hamster (Chinese) (<i>Cricetulus griseus</i>)	0	0	0	0	0	0	0	0	0						
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	0	146	0	0	0	0	0	0	0						
Other rodent (other <i>Rodentia</i>)	0	104	0	0	0	0	0	0	0						
Rabbit (<i>Oryctolagus cuniculus</i>)	0	164	0	0	33	6	45	6	0						
Cat (<i>Felis catus</i>)	0	0	0	0	0	0	0	0	0						
Dog (<i>Canis familiaris</i>)	0	0	10	0	3	0	2	35	0						
Ferret (<i>Mustela putorius furo</i>)	0	388	0	0	0	0	0	0	0						
Other carnivore (other <i>Carnivora</i>)	0	0	0	0	0	0	0	0	0						
Horse and other equids (<i>Equidae</i>)	0	0	0	0	0	0	0	0	0						
Pig (<i>Sus scrofa domestica</i>)	0	21	105	60	48	15	0	0	42						
Goat (<i>Capra aegagrus hircus</i>)	0	0	0	0	0	0	0	0	0						
Sheep (<i>Ovis aries</i>)	0	66	0	0	0	0	187	0	0						
Cattle (<i>Bos primigenius</i>)	0	48	140	0	0	0	0	0	0						
Primate															
New World monkey	0	0	0	0	0	0	0	0	0						
Marmoset and tamarin	0	0	0	0	0	0	0	0	0						
Old World monkey	0	0	0	0	0	0	0	0	0						
Cynomolgus monkey (<i>Macaca fascicularis</i>)	0	32	0	0	103	3	0	3	0						
Rhesus monkey (<i>Macaca mulatta</i>)	0	15	0	0	8	0	0	4	0						
Other mammal (other <i>Mammalia</i>)	0	0	0	0	0	0	0	1	0						
Bird															
Domestic fowl (<i>Gallus domesticus</i>)	0	0	0	0	0	0	0	0	0						
Other bird (other <i>Aves</i>)	0	10	0	0	0	0	0	0	0						
Reptile (Reptilia)															
	0	0	0	0	0	0	0	0	0						
Amphibia															
Rana (<i>Temporaria and Pipiens</i>)	0	0	0	0	0	0	0	0	0						
Xenopus (<i>Laevis and Tropicalis</i>)	0	0	0	0	0	0	0	0	0						
Other amphibian (other <i>Amphibia</i>)	0	0	0	0	0	0	0	0	0						
Fish															
Zebrafish (<i>Danio rerio</i>)	24	0	0	1,130	0	0	0	0	0						
Other fish (other <i>Pisces</i>)	5	0	0	0	0	0	0	0	0						
Cephalopod (Cephalopoda)															
	0	0	0	0	0	0	0	0	0						
Total	60,077	48,501	6,339	43,638	13,104	2,566	2,602	11,397	1,231						
% of total	17	14	2	12	4	0.7	0.7	3	0.3						

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

Species of animal	Translational/applied research										Total	% of total	
	Number of procedures												
	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 (<i>Mus musculus</i>)	11,784	3,100	39,238	1,053	386	2,074	0	7,695	226,822	63			
Rat (<i>Rattus norvegicus</i>)	477	2,016	14,266	15	216	77	0	5,808	45,997	13			
Guinea-pig (<i>Cavia porcellus</i>)	0	0	17,139	0	16	58	0	61	18,076	5			
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	0	0	0	0	0	0	0	0	1,017	0.3			
Hamster (Chinese) (<i>Cricetus griseus</i>)	0	0	0	0	0	0	0	0	0	0			
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	0	0	0	0	0	0	0	0	146	0.04			
Other rodent (other Rodentia)	0	0	0	0	63	0	0	0	167	0.05			
Rabbit (<i>Oryctolagus cuniculus</i>)	142	0	1,968	135	16	26	0	166	2,707	0.8			
Cat (<i>Felis catus</i>)	0	0	0	171	0	0	0	0	171	0.05			
Dog (<i>Canis familiaris</i>)	0	0	205	123	0	0	0	173	551	0.2			
Ferret (<i>Mustela putorius furo</i>)	0	0	0	6	0	9	0	0	403	0.1			
Other carnivore (other Carnivora)	0	0	0	113	0	0	0	0	113	0.03			
Horse and other equids (<i>Equidae</i>)	0	0	0	22	0	0	0	0	22	0.01			
Pig (<i>Sus scrofa domestica</i>)	0	94	2	218	518	0	0	10	1,133	0.3			
Goat (<i>Capra aegagrus hircus</i>)	0	0	0	280	0	0	0	0	280	0.1			
Sheep (<i>Ovis aries</i>)	0	0	0	1,343	78	74	0	22	1,770	0.5			
Cattle (<i>Bos primigenius</i>)	0	0	0	2,158	310	0	0	0	2,656	0.7			
Primate													
New World monkey	0	0	0	0	0	0	0	0	0	0			
Marmoset and tamarin	0	0	0	0	0	0	0	0	0	0			
Old World monkey	0	0	0	0	0	0	0	51	192	0.1			
Cynomolgus monkey (<i>Macaca fascicularis</i>)	0	0	0	0	7	0	0	0	34	0.01			
Rhesus monkey (<i>Macaca mulatta</i>)	0	0	0	0	0	0	0	0	1	0.0003			
Other mammal (other Mammalia)	0	0	0	0	0	0	0	0	0	0			
Bird													
Domestic fowl (<i>Gallus domesticus</i>)	0	0	235	6,512	1,509	166	0	0	8,422	2			
Other bird (other Aves)	0	0	25	1,029	283	345	0	0	1,692	0.5			
Reptile (Reptilia)	0	0	0	0	0	0	0	0	0	0			
Amphibia													
Rana (<i>Temporaria</i> and <i>Pipiens</i>)	0	0	0	0	0	0	0	0	0	0			
Xenopus (<i>Xenopus</i> and <i>Tropicalis</i>)	0	0	0	0	0	0	0	0	0	0			
Other amphibian (other Amphibia)	0	0	0	56	0	0	0	0	56	0.02			
Fish													
Zebrafish (<i>Danio rerio</i>)	0	0	0	0	608	0	0	12,470	14,232	4			
Other fish (other Pisces)	0	0	0	18,516	9,802	200	0	3,175	31,698	9			
Cephalopod (Cephalopoda)	0	0	0	0	0	0	0	0	0	0			
Total	12,403	5,210	73,078	31,750	13,812	3,029	0	29,631	358,358	100			
% of total	3	1	20	9	4	0.8	0	8	100				

Table 7.1 Experimental procedures by species of animal: regulatory use

Great Britain 2014

Species of animal	Routine production					Quality control				Other efficacy and tolerance testing	Toxicity and other safety testing including pharmacology	Total	Number of procedures % of total
	Blood-based products	Monoclonal antibody production (ascites)	Other	Batch safety testing	Pyrogenicity testing	Batch potency testing	Other quality controls	Other efficacy and tolerance testing					
								Pyrogenicity testing	Batch potency testing				
Mammal													
Mouse (<i>Mus musculus</i>)	92	0	12	12,453	0	4,800	14,005	1,321	156,267	188,950	37		
Rat (<i>Rattus norvegicus</i>)	1,403	0	98	99	0	1,320	262	1,134	107,637	111,963	22		
Guinea-pig (<i>Cavia porcellus</i>)	10	0	0	923	0	4,317	1,402	0	475	7,127	1		
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	114	0	0	19	0	0	304	0	911	1,348	0.3		
Hamster (Chinese) (<i>Cricetulus griseus</i>)	0	0	0	0	0	0	0	0	0	0	0		
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	0	0	0	0	0	0	0	0	0	0	0		
Other rodent (other <i>Rodentia</i>)	0	0	0	0	0	0	0	74	198	272	0.1		
Rabbit (<i>Oryctolagus cuniculus</i>)	336	0	554	28	3,167	1,354	9	48	3,974	9,470	2		
Cat (<i>Felis catus</i>)	0	0	0	0	0	0	0	0	0	0	0		
Dog (<i>Canis familiaris</i>)	6	0	6	0	0	0	0	2	3,420	3,434	0.7		
Ferret (<i>Mustela putorius furo</i>)	0	0	0	0	0	0	0	0	0	0	0		
Other carnivore (other <i>Carnivora</i>)	0	0	0	0	0	0	0	0	0	0	0		
Horse and other equids (<i>Equidae</i>)	1,767	0	6,051	0	0	0	0	37	44	7,899	2		
Pig (<i>Sus scrofa domestica</i>)	22	0	1	64	0	88	0	386	671	1,232	0.2		
Goat (<i>Capra aegagrus hircus</i>)	26	0	6	0	0	0	0	0	24	56	0.01		
Sheep (<i>Ovis aries</i>)	4,369	0	32,326	0	0	155	0	0	16	36,866	7		
Cattle (<i>Bos primigenius</i>)	0	0	68	20	0	628	0	162	821	1,699	0.3		
Primate													
New World monkey	0	0	0	0	0	0	0	0	0	0	0		
Marmoset and tamarin	0	0	0	0	0	0	0	0	0	0	0		
Old World monkey	474	0	3	0	0	0	0	3	2,252	2,732	0.5		
Cynomolgus monkey (<i>Macaca fascicularis</i>)	0	0	0	0	0	0	0	0	19	19	0.004		
Rhesus monkey (<i>Macaca mulatta</i>)	0	0	0	0	0	0	0	0	0	0	0		
Other mammal (other <i>Mammalia</i>)	2	0	0	0	0	0	0	36	0	38	0.01		
Bird													
Domestic fowl (<i>Gallus domesticus</i>)	940	0	97,301	560	0	3,492	10	2,023	11,045	115,371	23		
Other bird (other <i>Aves</i>)	57	0	41	0	0	0	0	149	1,918	2,165	0.4		
Reptile (Reptilia)	0	0	0	0	0	0	0	0	0	0	0		
Amphibia													
Rana (<i>Temporaria and Pipiens</i>)	0	0	0	0	0	0	0	0	0	0	0		
Xenopus (<i>Laevis and Tropicalis</i>)	0	0	0	0	0	0	0	0	0	0	0		
Other amphibian (other <i>Amphibia</i>)	0	0	0	0	0	0	0	0	0	0	0		
Fish													
Zebrafish (<i>Danio rerio</i>)	0	0	0	0	0	0	0	0	882	882	0.2		
Other fish (other <i>Pisces</i>)	0	0	0	0	0	0	27	1,103	14,953	16,083	3		
Cephalopod (Cephalopoda)	0	0	0	0	0	0	0	0	0	0	0		
Total	9,618	0	136,467	14,166	3,167	16,154	16,019	6,478	305,527	507,596	100		
% of total	2	0	27	3	0.6	3	3	1	60	100	100		

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

Great Britain 2014		Legislative requirement										Total	% of total	
Species of animal	Legislative requirement										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	162,462	13,774	1,327	5,020	4,321	1,130	479	0	0	0	437	188,950	37	
Rat	60,910	842	20	29,625	16,236	1,343	1,809	12	0	0	1,156	111,963	22	
All other rodents	7,313	1,162	0	0	198	40	0	0	0	0	34	8,747	2	
Rabbit	5,625	1,414	1,138	484	748	0	0	0	0	0	61	9,470	2	
Cat	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dog	2,903	2	0	0	122	0	0	0	0	0	407	3,434	0.7	
Ferret	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other carnivore	0	0	0	0	0	0	0	0	0	0	0	0	0	
Horse and other equids	0	93	1,767	0	0	0	0	0	0	0	6,039	7,899	2	
Pigs	433	799	0	0	0	0	0	0	0	0	0	1,232	0.2	
All other ungulates	0	1,732	4,395	3	62	0	0	68	0	0	32,361	38,621	8	
Primate														
New World monkey	0	0	0	0	0	0	0	0	0	0	0	0	0	
Old World monkey	2,735	0	0	0	0	0	0	0	0	0	16	2,751	0.5	
All other mammals	0	36	2	0	0	0	0	0	0	0	0	38	0.01	
Bird	0	106,444	0	42	972	0	0	8,553	0	0	1,525	117,536	23	
Reptile, amphibian	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fish	2,520	2,110	0	7,315	4,598	0	0	0	0	0	422	16,965	3	
Total	244,901	128,408	8,649	42,489	27,257	2,513	2,288	8,633	0	0	42,458	507,596	100	
% of total	48	25	2	8	5	0.5	0.5	2	0	0	8	100	100	

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

Great Britain 2014				Number of procedures	
Species of animal	Origin of legislative requirement			Total	% of total
	Legislation satisfying EU requirements	Legislation satisfying only UK requirements	Legislation satisfying Non-EU requirements only		
Mammal					
Mouse (<i>Mus musculus</i>)	170,296	60	18,594	188,950	37
Rat (<i>Rattus norvegicus</i>)	110,991	28	934	111,953	22
Guinea-pig (<i>Cavia porcellus</i>)	6,397	4	726	7,127	1
Hamster (Syrian) (<i>Mesocricetus auratus</i>)	930	0	418	1,348	0.3
Hamster (Chinese) (<i>Cricetulus griseus</i>)	0	0	0	0	0
Mongolian Gerbil (<i>Meriones unguiculatus</i>)	0	0	0	0	0
Other rodent (<i>other Rodentia</i>)	238	34	0	272	0.1
Rabbit (<i>Oryctolagus cuniculus</i>)	9,467	0	3	9,470	2
Cat (<i>Felis catus</i>)	0	0	0	0	0
Dog (<i>Canis familiaris</i>)	3,434	0	0	3,434	0.7
Ferret (<i>Mustela putorius furo</i>)	0	0	0	0	0
Other carnivore (<i>other Carnivora</i>)	0	0	0	0	0
Horse and other equids (<i>Equidae</i>)	7,899	0	0	7,899	2
Pig (<i>Sus scrofa domesticus</i>)	1,232	0	0	1,232	0.2
Goat (<i>Capra aegagrus hircus</i>)	30	26	0	56	0.01
Sheep (<i>Ovis aries</i>)	36,740	45	81	36,866	7
Cattle (<i>Bos primigenius</i>)	1,699	0	0	1,699	0.3
Primate					
New World monkey					
Marmoset and tamarin	0	0	0	0	0
Old World monkey					
Cynomolgus monkey (<i>Macaca fascicularis</i>)	2,732	0	0	2,732	0.5
Rhesus monkey (<i>Macaca mulatta</i>)	19	0	0	19	0.004
Other mammal (<i>other Mammalia</i>)	36	2	0	38	0.01
Bird					
Domestic fowl (<i>Gallus domesticus</i>)	113,930	830	611	115,371	23
Other bird (<i>other Aves</i>)	1,995	128	42	2,165	0.4
Reptile (<i>Reptilia</i>)	0	0	0	0	0
Amphibia					
Rana (<i>Temporaria and Pipiens</i>)	0	0	0	0	0
Xenopus (<i>Laevis and Tropicalis</i>)	0	0	0	0	0
Other amphibian (<i>other Amphibia</i>)	0	0	0	0	0
Fish					
Zebrafish (<i>Danio rerio</i>)	882	0	0	882	0.2
Other fish (<i>other Pisces</i>)	14,204	0	1,879	16,083	3
Cephalopod (<i>Cephalopoda</i>)	0	0	0	0	0
Total	483,151	1,157	23,288	507,596	100
% of total	95	0.2	5	100	

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

Species of animal	Acute and sub-acute toxicity testing methods										Other type of regulatory test or procedure										Number of procedures																																
	LD50 and LC50					Non-lethal methods					Skin irritation/corrosion					Eye irritation/corrosion					Repeated dose toxicity					Carcinogenicity					Genotoxicity					Reproductive toxicity					Developmental toxicity					Safety testing in food and feed area					Target animal safety		
	Other lethal methods	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	131,204	0	1,500	0	6,047	0	6,486	4,182	3,520	96	1,188	0																																									
Mouse	2,137	957	4,426	0	0	0	34,402	4,314	3,301	28,366	19,449	0																																									
Rat	0	0	561	0	0	0	0	752	0	0	0	0																																									
All other rodents	0	0	30	659	0	435	407	0	0	55	2,261	0																																									
Rabbit	0	0	0	0	0	0	0	0	0	0	0	0																																									
Cat	0	0	278	0	0	0	2,222	0	0	0	17	0																																									
Dog	0	0	0	0	0	0	0	0	0	0	0	0																																									
Ferret	0	0	0	0	0	0	0	0	0	0	0	0																																									
Other carnivore	0	0	0	0	0	0	0	0	0	0	0	0																																									
Horse and other equids	0	0	0	0	0	0	0	0	0	0	0	0																																									
Pigs	0	0	6	0	0	0	301	0	0	0	0	0																																									
All other ungulates	0	0	0	0	0	0	0	0	0	0	0	0																																									
Primate	0	0	0	0	0	0	0	0	0	0	0	0																																									
New World monkey	0	0	198	0	0	0	1,556	0	0	0	0	0																																									
Old World monkey	0	0	0	0	0	0	0	0	0	0	0	0																																									
All other mammals	0	0	0	0	0	0	0	0	0	0	0	0																																									
Bird	0	0	0	0	0	0	0	0	0	0	0	0																																									
Reptile, amphibian	0	0	0	0	0	0	0	0	0	0	0	0																																									
Fish	2,495	0	0	659	6,047	435	45,374	9,248	6,821	28,517	480	0																																									
Total	135,836	957	6,999	659	6,047	435	45,374	9,248	6,821	28,517	23,365	9,265																																									
% of total	44	0.3	2	0.2	2	0.1	15	3	2	9	8	3																																									

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

Species of animal	Other type of regulatory test or procedure										Number of procedures										
	Neurotoxicity					Phototoxicity					Ecotoxicity					Total			% of total		
	Kinetics	Pharmo-dynamics	Pharmacokinetics	Chronic toxicity	Acute toxicity ¹	Reproductive toxicity	Endocrine activity	Bioaccumulation	Other	Other type of toxicity or safety test	Total	% of total									
Mammal	0	1,365	178	0	24	0	0	0	0	507	156,267	51									
Mouse	80	3,048	3,583	0	48	0	0	0	0	3,526	107,637	35									
Rat	0	18	22	0	0	0	0	0	198	33	1,584	0.5									
All other rodents	0	10	0	0	0	0	0	0	0	117	3,974	1									
Rabbit	0	0	0	0	0	0	0	0	0	0	0	0									
Cat	0	135	224	0	0	0	0	0	380	164	3,420	1									
Dog	0	0	0	0	0	0	0	0	0	0	0	0									
Ferret	0	0	0	0	0	0	0	0	0	0	0	0									
Other carnivore	0	0	0	0	0	0	0	0	0	0	0	0									
Horse and other equids	0	0	0	0	0	0	0	0	0	0	44	0.01									
Pigs	0	73	20	0	0	0	0	0	0	236	671	0.2									
All other ungulates	0	71	0	0	0	0	0	0	0	689	861	0.3									
Primate	0	0	0	0	0	0	0	0	0	0	0	0									
New World monkey	0	272	46	0	0	0	0	0	0	199	2,271	0.7									
Old World monkey	0	0	0	0	0	0	0	0	0	0	0	0									
All other mammals	0	394	0	0	284	0	261	0	341	12	12,963	4									
Bird	0	0	0	0	0	0	0	0	0	0	0	0									
Reptile, amphibian	0	36	135	0	3,524	5,499	1,126	0	0	0	15,835	5									
Total	80	5,422	4,208	0	3,880	5,499	1,705	1,126	919	5,483	305,527	100									
% of total	0.03	2	1	0	1	2	0.6	0.4	0.3	2	100	1									

1. 138 procedures used fish (specifically Rainbow Trout) for the testing of a household product ingredient required under REACH. REACH is an EU regulation concerning the registration, evaluation, authorisation and restriction of chemicals.

Table 8 Creation of new lines and maintenance of established lines of genetically altered animals by species of animal, severity and genetic status¹

Great Britain 2014		Number of procedures				
Species of animal	Actual severity	Genetic status			Total	% of total
		Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mouse	Sub threshold	31,492	596,877	183,271	811,640	46
	Non-recovery	134	1,419	157	1,710	0.1
	Mild	129,953	595,333	120,294	845,580	48
	Moderate	14,863	28,867	25,641	69,371	4
	Severe	551	20,663	12,507	33,721	2
	Total	176,993	1,243,159	341,870	1,762,022	100
Rat	Sub threshold	177	2,391	97	2,665	13
	Non-recovery	12	0	0	12	0.1
	Mild	620	13,466	2,980	17,066	85
	Moderate	100	17	12	129	0.6
	Severe	32	98	138	268	1
	Total	941	15,972	3,227	20,140	100
Pigs	Sub threshold	0	67	0	67	18
	Non-recovery	0	0	0	0	0
	Mild	98	55	0	153	41
	Moderate	150	0	0	150	41
	Severe	0	0	0	0	0
	Total	248	122	0	370	100
Sheep	Sub threshold	0	1	0	1	0.9
	Non-recovery	0	0	0	0	0
	Mild	28	9	0	37	35
	Moderate	68	0	0	68	64
	Severe	0	0	0	0	0
	Total	96	10	0	106	100
Birds	Sub threshold	18	30	0	48	6
	Non-recovery	0	0	0	0	0
	Mild	211	245	72	528	66
	Moderate	0	0	64	64	8
	Severe	0	129	29	158	20
	Total	229	404	165	798	100
Amphibians	Sub threshold	0	2,740	130	2,870	73
	Non-recovery	0	0	0	0	0
	Mild	286	707	0	993	25
	Moderate	0	90	0	90	2
	Severe	0	0	0	0	0
	Total	286	3,537	130	3,953	100
Fish	Sub threshold	639	79,489	199	80,327	52
	Non-recovery	15	209	0	224	0.1
	Mild	2,341	63,555	3,271	69,167	45
	Moderate	265	2,675	1,633	4,573	3
	Severe	1	175	0	176	0.1
	Total	3,261	146,103	5,103	154,467	100
All species	Sub threshold	32,326	681,595	183,697	897,618	46
	Non-recovery	161	1,628	157	1,946	0.1
	Mild	133,537	673,370	126,617	933,524	48
	Moderate	15,446	31,649	27,350	74,445	4
	Severe	584	21,065	12,674	34,323	2
	Total	182,054	1,409,307	350,495	1,941,856	100

1. Some species were not involved in the creation/breeding of genetically altered animals in 2014. Therefore, these species are not listed in this table.

Table 9.1 Creation of new lines of genetically altered animals by species of animal, severity, purpose and genetic status¹

Species of animal	Actual severity	Basic research by genetic status				Translational/applied research by genetic status				Total by genetic status				Total	Number of procedures	% of total		
		Not genetically altered		Genetically altered without a harmful phenotype		Not genetically altered		Genetically altered without a harmful phenotype		Not genetically altered		Genetically altered without a harmful phenotype					Genetically altered with a harmful phenotype	
Mouse	Sub threshold			51,306	25,888	0	476	1	6,525	51,782	25,889	84,196	28					
	Non-recovery	40	927	0	153	0	0	0	40	927	153	1,120	0.4					
	Mild	54,565	94,111	78	30,647	78	1,675	30	54,643	95,786	30,677	181,106	60					
	Moderate	13,071	11,758	279	7,514	279	47	0	13,350	11,805	7,514	32,669	11					
	Severe	43	288	0	786	0	3	0	43	291	786	1,120	0.4					
	Total	74,244	158,390	357	64,988	357	2,201	31	74,601	160,591	65,019	300,211	100					
Rat	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	277	8	117	0	117	0	132	394	8	132	534	84					
	Moderate	31	0	59	0	59	0	12	90	0	12	102	16					
	Severe	1	0	0	0	0	0	0	1	0	0	1	0.2					
	Total	309	8	176	0	176	0	144	485	8	144	637	100					
Pigs	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	98	55	0	0	0	0	0	98	55	0	153	50					
	Moderate	150	0	0	0	0	0	0	150	0	0	150	50					
	Severe	0	0	0	0	0	0	0	0	0	0	0	0					
	Total	248	55	0	0	0	0	0	248	55	0	303	100					
Sheep	Sub threshold	0	1	0	0	0	0	0	0	1	0	1	0.9					
	Non-recovery	0	0	0	0	0	0	0	0	0	0	0	0					
	Mild	28	9	0	0	0	0	0	28	9	0	37	35					
	Moderate	68	0	0	0	0	0	0	68	0	0	68	64					
	Severe	0	0	0	0	0	0	0	0	0	0	0	0					
	Total	96	10	0	0	0	0	0	96	10	0	106	100					
Birds	Sub threshold	11	3	7	0	7	1	0	18	4	0	22	4					
	Non-recovery	0	0	0	0	0	0	0	0	0	0	0	0					
	Mild	172	112	39	0	39	113	0	211	225	0	436	74					
	Moderate	0	0	0	0	0	0	0	0	0	0	0	0					
	Severe	0	0	0	0	0	129	0	0	129	0	129	22					
	Total	183	115	46	0	46	243	0	229	358	0	587	100					
Amphibians	Sub threshold	0	235	0	130	0	0	0	0	235	130	365	37					
	Non-recovery	0	0	0	0	0	0	0	0	0	0	0	0					
	Mild	0	532	0	0	0	0	0	0	532	0	532	54					
	Moderate	0	90	0	0	0	0	0	0	90	0	90	9					
	Severe	0	0	0	0	0	0	0	0	0	0	0	0					
	Total	0	857	0	130	0	0	0	0	857	130	987	100					
Fish	Sub threshold	459	2,700	0	0	0	0	0	459	2,700	0	3,159	6					
	Non-recovery	0	0	0	0	0	0	0	0	0	0	0	0					
	Mild	1,000	43,397	0	2,710	0	0	0	1,000	43,397	2,710	47,107	92					
	Moderate	115	708	0	0	0	0	0	115	708	0	823	2					
	Severe	0	3	0	0	0	0	0	0	3	0	3	0.01					
	Total	1,574	46,808	0	2,710	0	0	0	1,574	46,808	2,710	51,092	100					
All species	Sub threshold	6,995	54,245	7	26,018	7	477	1	7,002	54,722	26,019	87,743	25					
	Non-recovery	40	927	0	153	0	0	0	40	927	153	1,120	0.3					
	Mild	56,140	138,224	234	33,357	234	1,788	162	56,374	140,012	33,519	229,905	65					
	Moderate	13,435	12,556	338	7,514	338	47	12	13,773	12,603	7,526	33,902	10					
	Severe	44	291	0	786	0	132	0	44	423	786	1,253	0.4					
	Total	76,654	206,243	579	67,828	579	2,444	175	77,233	208,687	68,003	353,923	100					

1. Some species were not involved in the creation of genetically altered animals in 2014. Therefore, these species are not listed in this table.

Table 9.2 Creation of new lines of genetically altered animals by species of animal and severity: basic research¹

Species of animal	Actual severity	Basic Research											Number of procedures			
		Oncology	Cardiovascular Blood and Lymphatic System	Nervous System	Respiratory System	Gastrointestinal System including Liver	Musculoskeletal System	Immune System	Urogenital/Reproductive System	Sensory Organs (skin, eyes and ears)	Endocrine System/ Metabolism	Multisystemic	Ethology / Animal Behaviour /Animal Biology	Other	Total	% of total
Mouse	Sub threshold	20,262	2,531	8,014	115	1,527	179	23,084	838	2,487	0	22,076	0	2,606	83,719	28
	Non-recovery	5	29	141	0	19	0	68	0	0	524	178	0	156	1,120	0.4
	Mild	10,067	6,908	7,145	320	1,566	1,277	13,632	11,509	4,567	107,466	131	0	10,217	179,323	60
	Moderate	4,411	4,761	1,430	10	162	91	2,026	1,120	151	676	12,952	1,294	3,259	32,343	11
	Severe	130	58	76	0	8	1	80	4	47	25	631	0	57	1,117	0.4
Total	34,875	14,287	16,806	445	3,281	1,548	38,890	13,471	7,252	5,744	143,303	1,425	16,295	297,622	100	
Rat	Sub threshold	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
	Mild	0	54	0	0	0	0	0	0	0	0	0	231	285	90	
	Moderate	0	0	0	0	0	0	31	0	0	0	0	0	0	31	10
	Severe	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.3
Total	0	54	0	0	0	0	31	0	0	0	1	0	231	317	100	
Pigs	Sub threshold	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
	Mild	0	0	0	0	0	0	12	0	0	0	141	0	0	153	50
	Moderate	0	0	0	0	0	0	0	0	0	0	150	0	0	150	50
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	12	0	0	0	291	0	0	303	100	
Sheep	Sub threshold	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	1	0	0	1	0.9
	Mild	0	0	0	0	0	0	0	0	0	0	24	0	0	37	35
	Moderate	0	0	0	0	0	0	13	0	0	0	68	0	0	68	64
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	13	0	0	0	93	0	0	106	100	
Birds	Sub threshold	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
	Mild	0	0	0	0	0	0	0	0	0	0	118	0	0	284	95
	Moderate	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
Total	0	0	0	0	0	0	0	180	0	0	118	0	0	298	100	
Amphibians	Sub threshold	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	235	0	130	365	37
	Mild	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Moderate	0	266	0	0	0	0	0	0	0	0	0	0	266	532	54
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	90	90	9
Total	0	266	0	0	0	0	0	0	0	0	235	0	486	987	100	
Fish	Sub threshold	96	0	1,570	0	0	317	65	0	0	565	0	546	3,159	6	
	Non-recovery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mild	4,092	4,616	7,499	0	40	377	1,850	0	955	0	26,657	0	1,021	47,107	92
	Moderate	115	1	10	0	15	292	15	0	2	152	0	236	0	823	2
	Severe	0	1	1	0	0	0	1	0	0	0	0	0	0	3	0.01
Total	4,303	4,618	9,080	0	40	986	1,931	0	957	0	27,374	0	1,803	51,092	100	
All species	Sub threshold	20,368	2,531	9,584	115	1,527	496	23,149	852	2,487	0	22,877	0	3,282	87,258	25
	Non-recovery	5	29	141	0	19	0	68	0	0	524	178	0	156	1,120	0.3
	Mild	14,159	11,844	14,644	320	1,605	1,654	15,507	11,675	5,522	107,466	131	0	11,735	227,721	65
	Moderate	4,526	4,762	1,440	10	162	383	2,072	1,120	163	676	13,322	1,294	3,585	33,505	10
	Severe	130	59	77	0	8	1	81	4	47	25	632	0	57	1,121	0.3
Total	39,178	19,225	25,886	445	3,321	2,594	40,877	13,651	8,209	5,744	171,415	1,425	18,815	350,725	100	

1. Some species were not involved in the creation of genetically altered animals for basic research in 2014. Therefore, these species are not listed in this table.

Table 10 Maintenance of established lines of genetically altered animals by species of animal, severity and genetic status¹

Great Britain 2014		Number of procedures				
Species of animal	Actual severity	Genetic status			Total	% of total
		Not genetically altered	Genetically altered without a harmful phenotype	Genetically altered with a harmful phenotype		
Mouse	Sub threshold	24,967	545,095	157,382	727,444	50
	Non-recovery	94	492	4	590	0.04
	Mild	75,310	499,547	89,617	664,474	45
	Moderate	1,513	17,062	18,127	36,702	3
	Severe	508	20,372	11,721	32,601	2
	Total	102,392	1,082,568	276,851	1,461,811	100
Rat	Sub threshold	177	2,391	97	2,665	14
	Non-recovery	12	0	0	12	0.1
	Mild	226	13,458	2,848	16,532	85
	Moderate	10	17	0	27	0.1
	Severe	31	98	138	267	1
	Total	456	15,964	3,083	19,503	100
Pigs	Sub threshold	0	67	0	67	100
	Non-recovery	0	0	0	0	0
	Mild	0	0	0	0	0
	Moderate	0	0	0	0	0
	Severe	0	0	0	0	0
	Total	0	67	0	67	100
Birds	Sub threshold	0	26	0	26	12
	Non-recovery	0	0	0	0	0
	Mild	0	20	72	92	44
	Moderate	0	0	64	64	30
	Severe	0	0	29	29	14
	Total	0	46	165	211	100
Amphibians	Sub threshold	0	2,505	0	2,505	84
	Non-recovery	0	0	0	0	0
	Mild	286	175	0	461	16
	Moderate	0	0	0	0	0
	Severe	0	0	0	0	0
	Total	286	2,680	0	2,966	100
Fish	Sub threshold	180	76,789	199	77,168	75
	Non-recovery	15	209	0	224	0.2
	Mild	1,341	20,158	561	22,060	21
	Moderate	150	1,967	1,633	3,750	4
	Severe	1	172	0	173	0.2
	Total	1,687	99,295	2,393	103,375	100
All species	Sub threshold	25,324	626,873	157,678	809,875	51
	Non-recovery	121	701	4	826	0.1
	Mild	77,163	533,358	93,098	703,619	44
	Moderate	1,673	19,046	19,824	40,543	3
	Severe	540	20,642	11,888	33,070	2
	Total	104,821	1,200,620	282,492	1,587,933	100

1. Some species were not involved in the breeding of genetically altered animals in 2014. Therefore, these species are not listed in this table.

Appendix

General system of control under the Animals (Scientific Procedures) Act 1986

Introduction

1. The Animals (Scientific Procedures) Act 1986 puts into effect a rigorous system of controls on scientific work on living animals, including the need for:
 - a. both the researcher and the project to be separately licensed;
 - b. stringent safeguards on animal pain and suffering; and
 - c. general requirements to ensure the care and welfare of animals.

The Act implements the requirements of European Directive 2010/63/EU.

2. Operation of the Act is a reserved issue in Great Britain, with the Home Office administering the legislation in England, Scotland and Wales. The Act is separately administered in Northern Ireland.

Scope of the Act

3. The 1986 Act controls any experimental or other scientific procedure applied to a 'protected animal' that may have the effect of causing that animal pain, suffering, distress or lasting harm. Such work is referred to in the Act as a 'regulated procedure'.
4. 'Protected animals' are defined as all living vertebrate animals, except man, plus cephalopods. The definition extends to fetal, larval or embryonic forms that have reached specified stages in their development.
5. Under the Act an animal is regarded as 'living' until 'the permanent cessation of circulation or complete destruction of its brain'. Procedures carried out on decerebrate animals are also subject to the controls of the Act.
6. The definition of a regulated procedure encompasses:
 - a. most breeding of animals with genetic defects;
 - b. production of antisera and other blood products;
 - c. the maintenance and passage of tumours and parasites;
 - d. the administration for a scientific purpose of an anaesthetic, analgesic, tranquilliser or other drug to dull perception.

Killing an animal requires licence authority in certain circumstances.

7. The controls of the 1986 Act do not extend to procedures applied to animals in the course of:
 - a. non-experimental clinical veterinary practice, non-experimental agricultural practice or practices undertaken for the purposes of recognised animal husbandry;
 - b. the administration of any substance or article to an animal for research purposes in accordance with an animal test certificate granted under the Veterinary Medicines Regulations 2011;⁴¹

⁴¹ S.I. 2011/2159.

- c. the ringing, tagging or marking of an animal, or the application of any other humane procedure for the primary purpose of enabling an animal to be identified, provided that it causes only momentary pain or distress (or none at all) and no lasting harm.
8. Three kinds of licence are required for all work controlled by the Act. The procedures must be part of a programme of work authorised by a project licence and the person applying the regulated procedures must hold a personal licence. In addition, the place where the work is carried out must be licensed to do so. No work may be done unless the procedure, the animals used and the place where the work is to be done are specifically authorised in both project and personal licences.

Personal licences

9. A personal licence is the Home Secretary's endorsement that the holder is a suitable and competent person to carry out specified procedures on specified animals, under supervision where necessary. Applicants must be over 18 and are required to give details of their qualifications, training and experience. Those who have not previously held a Home Office licence need the endorsement of the named training and competency officer. Satisfactory completion of an accredited training course is also required before a personal licence is issued.
10. The Home Office is in the process of moving from a paper-based licensing system to an electronic based one. Because of this, it has not been possible to identify the exact number of personal licences in force at the end of December 2014. It is expected in 2016 that it will possible to identify the number of personal licences held once the conversion to the electronic based licensing system has been completed.
11. Nonetheless, on 31 December 2013, 16,112 active personal licences were in force. Personal licences continue to be in force until revoked but they must be reviewed at least every five years.

Project licences

12. A project licence is granted when the Home Secretary considers that the use of living animals in a programme of work, for a purpose permitted by the Act, is justified and the methods proposed appropriate.
13. In deciding whether and on what terms to authorise the project, the likely adverse effects on the animals used must be weighed against the potential benefits (to humans, other animals or the environment) that are expected to accrue from the work. Adequate consideration must also have been given to the feasibility of using alternative methods not involving living animals.
14. The holder of a project licence undertakes overall responsibility for the scientific direction and control of the work. New project licence applicants are required to complete an accredited training course before the licence is granted.

Establishment licences

15. Except where otherwise authorised in a project licence (for example, for field work at a specified place and time), any place where work is carried out under the Act must be licensed. Establishments that breed certain types of animal listed in Schedule 2 of the Act for use in scientific procedures ('breeding establishments'),

and establishments that obtain such animals from elsewhere and supply them to laboratories ('supplying establishments') must hold an appropriate licence to do so. Animals listed in Schedule 2 are: mice; rats; guinea pigs; hamsters; gerbils; rabbits; cats; dogs; ferrets; non-human primates; pigs (if genetically modified); sheep (if genetically modified); common quail (*Coturnix coturnix*); amphibians (of the species *Xenopus Laevis*, *Xenopus Tropicalis*, *Rana Temporaria* and *Rana Pipiens*); and zebrafish.

16. Licensed establishments are required to nominate a person to be responsible for the day-to-day care of animals and a veterinary surgeon to advise on their health and welfare.
17. There were 173 establishment licences in force on 31 December 2014. Of these, 172 were registered as user establishments, 111 as breeding establishments and 69 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.

Table 11 Procedures and project licences by type of licensed establishment

Great Britain 2014

Type of licensed establishment	Number of project licences where countable ¹ procedures were completed in 2014 by number of procedures										Number of project licences where no procedures were completed in 2014	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	Total						
Public health laboratories	8	2	0	3	1	2	0	3	19	0	6	25	12,316	0.3	
Universities, medical schools	352	195	254	266	158	102	87	463	1,877	11	518	2,406	1,881,813	49	
NHS hospitals	0	3	3	4	1	2	3	3	19	0	5	24	23,194	0.6	
Government departments	15	8	10	10	0	5	3	8	59	0	28	87	72,688	2	
Other public bodies	35	18	19	15	18	8	7	68	188	1	31	220	529,862	14	
Non-profit-making organisations	20	5	6	9	5	4	7	48	104	0	23	127	372,219	10	
Commercial organisations	26	17	25	26	14	13	6	74	201	1	43	245	975,347	25	
Total	456	248	317	333	197	136	113	667	2,467	13	654	3,134	3,867,439	100	

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 collected but 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 2014).

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