Statistics of animal use in research and teaching, Victoria

1 January 2021 – 31 December 2021

Report No. 39

Published by Animal Welfare Victoria
Department of Energy, Environment and Climate Action
1 Spring Street Melbourne, Victoria 3000
March 2023

ISBN 978-1-76136-225-5 **(pdf/online/MS word)**

Accessibility

If you would like to receive this publication in an alternative format, please telephone DEECA Customer Service Centre 136 186 or email sp.licensing@agriculture.vic.gov.au

Table of Contents

Part 1: Guide to reading the report 7
1.1 The use of animals in research and teaching 7
1.1.1 Why are animals still used for experiments? 7
1.1.2 What protections are in place? 7
1.1.3 Who is on an Animal Ethics Committee? 7
1.2 Reporting process 8
1.2.1 How is the data collected? 8
1.2.2 Why is this data collected? 8
1.2.3 What types of animals are counted? 8
1.2.4 Where are animals sourced from? 8
1.2.5 What is meant by the project purpose? 9
1.2.6 What is meant by the project benefit? 9
1.2.7 What is meant by the impact of activities? 9
1.2.8 What is meant by the number of deaths? 9
1.3 Understanding the 2021 statistics 10
1.3.1 How does the number of animals used compare to previous years? 10
1.3.2 Why are 96,611,408 embryonated eggs reported in 2021? 10
Part 2: Number of animals reported as used in 2021 11
2.1 Reported by animal type 11
2.2 Reported by project benefit 20
2.3 Number of animals used and animal deaths 25
Part 3: Animal use statistics from 2012 to 2021 27
3.1 Number of animals used in research, teaching and testing from 2012 – 2021 27
3.2 Number of specified animals used from 2012 – 2021 29
3.3 Number of animals used in breeding colonies from 2012 – 2021 31
4 Appendices 33
Appendix 1 33

List of tables

Table 2.1 Number of animals reported as used by animal type 11
Table 2.2 Number of animals reported as used by animal type and project purpose 13
Table 2.3 Number of non-specified animals used by animal type by source 16
Table 2.4 Number of specified animals used by animal type by source 19
Table 2.5 Number of animals reported as used by animal type, by project benefits 20
Table 2.6 Number of animals used, by project impact by project benefit 23
Table 2.7 Number of animals reported as used by project purpose 24
Table 2.8 Number of animals used and deaths by type 25
Table 3.1 Number of non-genetically modified specified animals in breeding colonies by animal type, 2012 – 2021 31
Table 3.2 Number of genetically modified specified animals in breeding colonies by animal type, 2012 – 2021 31
Table 3.3 Number of non-genetically modified non-specified animals in breeding colonies by animal type, 2020-2021 32
Table 3.4 Number of genetically modified non-specified animals in breeding colonies by animal type, 2020-2021 32
Table 4.1 Reporting categories 33

List of figures

Figure 3.1 Number of animals used, 2012 – 2021 27
Figure 3.2 Percentage of animals used by project purpose, 2017 – 2021 28
Figure 3.3 Percentage of animals used by impact type, 2017 – 2021 28
Figure 3.4 Number of specified mice used, 2012 – 2021 29
Figure 3.5 Number of specified animals, excluding mice and non-human primates 2012-2021 29
Figure 3.6 Number of non-human primates, 2012 - 2021 30
Figure 3.7 Number of specified mice in breeding colonies, 2012 – 2021 30

Executive Summary

In Victoria, the use of animals for scientific research, teaching and testing is regulated by the *Prevention of Cruelty to Animals Act 1986* (the Act). Organisations or individuals that conduct scientific procedures with animals must hold an authorising licence issued by Animal Welfare Victoria.

The Act also requires that the breeding of specified animals (guinea pigs, rats, mice, rabbits, and non-human primates) to be used in scientific procedures is authorised by a Specified Animals Breeding Licence. Licences are subject to conditions prescribed by the Prevention of Cruelty to Animals Regulations 2019.

Each year, licence holders are required to submit data on their use of animals. This report details the number and species of animals reported by licence holders for the period 1 January to 31 December 2021.

In this period, 1,720,638 animals were used under licence for scientific research, teaching and testing. This is a 1% increase in animal use in 2021 compared to 2020, and 7% above the 10-year average of 1,602,995 animals. The number of animals reported fluctuates each year due to variables such as changes to the focus of funded projects, technological advances, and economic factors.

A total of 96,611,408 embryonated eggs were reported in 2021. These embryonated eggs are reported distinct from other animal use given the scale, and as the category was first reported in 2018, to prevent the skewing of historical data. The embryonated eggs were primarily used for vaccine production. The number of embryonated eggs used increased by approximately 28.9 million in 2021 compared to 2020, which was primarily driven by a licence holder securing new markets to supply influenza vaccine.

In 2021, around 60% of the non-specified animals reported as used for scientific purposes were sourced from a commercial supplier, 27% were sourced from their natural habitat and 6% from own derivation. For specified animals, 62% were bred by the licence holders for their own supply, 23% were sourced from interstate institutions authorised to distribute specified animals and 14% were sourced from Victorian Specified Animal Breeding Licenced suppliers.

The most common impact on animals during research, teaching and testing was minor physiological challenge (43%), followed by minor conscious intervention (23%) and observational study involving minor interference (20%). Less than 1% of animals experienced death as an end point.

Following their use in research, teaching and testing, 27% of animals were humanely euthanised.

Introduction

Animals are used for research and discovery in many fields of science. The *Prevention of Cruelty to Animals Act 1986* (the Act) regulates their use in Victoria.

The use of animals for scientific research, teaching and testing is termed 'scientific procedures' by the Act and must only be conducted under a licence. Laboratory mice, rats, guinea pigs, rabbits and non-human primates are classed in the legislation as 'specified animals' and their commercial production and supply requires a separate licence (specified animal breeding licence).

Animal Welfare Victoria licenses and monitors the scientific use of animals in Victoria. It safeguards the well-being of animals by assessing applications for licences to ensure they meet legislative requirements; monitoring compliance; providing advice on best practice procedures, housing and care; and providing training for Animal Ethics Committee (AEC) members. The Act requires animal use to be conducted under a licence and overseen by an AEC.

The AEC is responsible for determining whether animal use is ethically justified and for ensuring that there are no available alternatives, prior to that use commencing. They weigh the predicted scientific or educational value of the projects against the potential effects on the welfare of the animals.

Each year, licence holders are required to submit data on their use of animals.

This report details the number and species of animals reported by licence holders for 2021. Research and teaching organisations report the number of animals they used for scientific procedures as well as any animals held in breeding colonies for in-house supply. Commercial producers of specified animals for the supply of research report the number of breeders and the number of stock animals produced.

This report includes information on where animals were sourced, the purpose and benefit of their use, the impact it had on their well-being, and whether they were killed at the conclusion of the project or not.

Part 1: Guide to reading the report

1.1 The use of animals in research and teaching

1.1.1 Why are animals still used for experiments?

Over time, many animal experiments have been replaced by valid alternative methods. The process of validation is complex and rigorous, to ensure reproducibility and accuracy. Unfortunately, not all research methods can be replaced at this time, but it is an ongoing endeavour. More information about replacement, reduction and refinement can be found at www.nc3rs.org.uk.

1.1.2 What protections are in place?

Researchers and teachers must apply to an AEC for every project they conduct using animals. Before giving their approval, the AEC must be convinced that the animal use is justified. They weigh the predicted scientific or educational value of the projects against the potential effects on the welfare of the animals.

Applicants must demonstrate to the AEC that their project fulfils the principles of the 3 R's (Replacement, Reduction and Refinement):

1. Replacement: methods that either partially or completely replace the use of animals must be sought. The use of animals is prohibited if a valid, non-animal alternative exists.
2. Reduction: animal numbers must be statistically calculated to be the minimum necessary to achieve the results, and not so low as to render the exercise invalid.
3. Refinement: every effort must be made to minimise the impact on the animals involved, e.g. applying technology that allows an earlier conclusion to the study; ensuring best-practice anaesthesia and analgesia; by providing care and husbandry that meets the animal's psychological and physical needs.

AECs have a legal obligation to refuse to approve any project they consider unjustified or lacking scientific merit.

1.1.3 Who is on an Animal Ethics Committee?

There are 4 categories of membership on an AEC. At least one member of each category must be present to make a decision about a new project. The categories are:

Category A	veterinarian.
Category B	researcher or teacher with substantial and recent experience in the use of animals for scientific purposes relevant to the business of the AEC.
Category C	person with demonstrable commitment to, and established experience in, furthering the welfare of animals, who is not employed by or otherwise associated with the institution, and who is not currently involved in the care and use of animals for scientific purposes.
Category D	person not employed by or otherwise associated with the institution and who has never been involved in the use of animals in scientific or teaching activities, bringing a completely independent view to the AEC, and must not fit the requirements of any other category.

1.2 Reporting process

1.2.1 How is the data collected?

Organisations and individuals licensed to use animals for research and teaching are responsible for providing the data to Animal Welfare Victoria by 31 March every year, for the previous calendar year.

1.2.2 Why is this data collected?

The reporting process collates data in the same areas that are the major considerations for the AEC when assessing an application. The broad outcomes of project purposes must be achieved by the more specific project benefits outlined in the application. The potential benefits are compared with the likely welfare impacts in a cost benefit analysis. Each member of the AEC must decide, according to their own judgement, if the project is justified in an ethical sense. This information informs policy decisions and is used to direct risk-based inspections and educational programs.

1.2.3 What types of animals are counted?

The types of animals counted in the statistics for research, teaching or testing projects are:

- mammals at and above the mid-point of gestation. This means that if research or teaching projects use a pregnant animal at or past the halfway point of gestation, she and all in utero offspring must be included in the statistics.
- birds and reptiles at and above the mid-point of incubation or gestation. This means eggs that are used for research or teaching must be reported in the statistics, if they are at or past the halfway point of incubation. For live bearing reptiles, the same rule applies as for mammals.
- fish and amphibians capable of independent feeding.
- adult decapod crustaceans and cephalopods.

Reporting of breeding groups kept by scientific procedures and specified animal breeding licence holders is slightly different. The number of animals used as breeders and the number of stock animals produced must be reported.

1.2.4 Where are animals sourced from?

Specified animals must only be sourced from:

- Victorian suppliers holding a specified animals breeding licence
- an in-house breeding colony kept by a scientific procedures licence holder, or
- an interstate or overseas supplier who meets all relevant requirements of their local jurisdiction for the breeding of these animals.

Other animals may be sourced from:

- an in-house breeding colony kept by a scientific procedures licence holder
- a commercial supplier
- private donation – this may include animals that continue to stay in the custody of the owners for the duration of the project (except farm animals)
- farms, where the animals do not leave the property
- their natural habitat – these animals may be sampled in the field and immediately released, or brought into captivity
- a captive colony or zoo
- a council pound – these animals must be treated in accordance with the Victorian code of practice for the use of animals from municipal pounds in scientific procedures, or
- another source, not specified above.

1.2.5 What is meant by the project purpose?

Animals must only be used when there is no other alternative and only for a limited number of reasons. These are:

- to obtain and establish significant information relevant to the understanding of humans and/or animals, or
- to maintain and improve human and/or animal health and welfare, or
- to improve animal management or production, or
- to obtain and establish significant information relevant to the understanding, maintenance or improvement of the natural environment, or
- to achieve educational outcomes in science, as specified in the relevant curriculum or competency requirements.

1.2.6 What is meant by the project benefit?

These categories refine and add definition to the broader project outcomes reported above. The reporting categories include:

- fundamental biology/physiology
- diseases - human
- diseases - animal
- diseases - zoonotic
- environmental monitoring/ecology
- domestic animal management/production
- wildlife management/conservation
- vertebrate pest management
- production of biological products
- development of techniques
- education
- training (student use of animals)
- regulatory product testing.

1.2.7 What is meant by the impact of activities?

These reporting categories represent the highest level of impact experienced by the animal during its involvement in research, teaching or testing. An AEC must consider the well-being of animals used for scientific purposes in terms of the cumulative effects of an animal's lifetime experience. The categories are defined in Appendix 1.

1.2.8 What is meant by the number of deaths?

The fate of the animals at the conclusion of a project depends on the aims of the project.
Some projects require analysis of the animal's tissues to conclude the experiment, and they are humanely killed to obtain these results. Occasionally, an unexpected adverse event, for example an unexpected reaction, surgical complication or unrelated illness will require an animal to be euthanised. Animals must be monitored with enough frequency to promptly detect any pain or distress, whether anticipated as a result of the study or not.

Animals may be reported as used but not recorded as dead because they have been, for example:

- captured then released back to the wild
- recruited to a study while kept in the care of their owner, for example on a farm or through a vet clinic
- rehomed at the conclusion of the project.

1.3 Understanding the 2021 statistics

1.3.1 How does the number of animals used compare to previous years?

There was a 1% increase in animal use in 2021 compared to 2020. The number of animals reported fluctuates each year due to variables such as changes to the focus of funded projects, technological advances, and economic factors.

1.3.2 Why are 96,611,408 embryonated eggs reported in 2021?

A total of 96,611,408 embryonated eggs were reported in 2021. These embryonated eggs are reported distinct from other animal use given the scale, and as the category was first reported in 2018, to prevent the skewing of historical data. The embryonated eggs were primarily used for vaccine production. The number of embryonated eggs used increased by approximately 28.9 million in 2021 compared to 2020, which was primarily driven by a licence holder securing new markets to supply influenza vaccine.

To generate vaccine, early-stage embryonated chicken eggs are seeded with the current seasonal strain of the flu virus. Viral replication occurs in the embryonated eggs. The eggs are then harvested in the days following the midpoint of their incubation period.

Part 2: Number of animals reported as used in 2021

In 2021, a total of 1,720,638 animals were reported to be used for research, teaching and testing (scientific procedures) in Victoria. The table below shows the number of animals used by type. There was a 1% increase in animal use in 2021 compared to the reported 1,701,099 animals in 2020.

This total number of animals reported excludes 96,611,408 embryonated eggs. The majority of these eggs were sourced from a commercial supplier. These eggs were primarily used for the production of influenza vaccines.

2.1 Reported by animal type

Table 2.1 Number of animals reported as used by animal type

Animal type	Number of animals
*Guinea pig (lab)	4,443
*Macaques	76
*Marmosets	71
*Mouse (lab)	438,515
*Primates other	1
*Rabbit (lab)	1,370
*Rat (lab)	13,986
Amphibians	14,500
Bird exotic captive	80
Bird exotic wild	594
Bird native captive	1,463
Bird native wild	49,707
Bird other	1,270
Cats (non-wild)	526
Cats (wild)	127
Cattle (domestic)	5,298
Cephalopods	183
Crustaceans	62,102
Dasyurids	1,544
Deer (domestic)	259
Dogs (non-wild)	3,277
Dogs, foxes (wild)	632
Exotic feral mammal other	188
Exotic Zoo mammal	19
Ferret (lab)	629
Fish	274,296
Goats (domestic)	441
Goats (wild)	1

Animal type	Number of animals
Hares (wild)	10
Horses (domestic)	337
Horses (wild)	77
Koalas	129
Laboratory mammal (non-specified)	133
Lizards	4,214
Macropods	2,836
Mice (wild)	1,543
Monotremes	291
Native mammal other	11,173
Native Rats, Mice	3,322
Other domestic mammals	49
Pigs (domestic)	1,167
Pigs (wild)	8
Possums, Gliders	1,975
Poultry	752,174
Rabbits (wild)	81
Rats (wild)	251
Reptile other	219
Seals, Sealions	152
Sheep (domestic)	63,768
Snakes	239
Tortoises/turtle	624
Whales, dolphins	60
Wombats	208
Total	**1,720,638**

**Specified animals*

Table 2.2 Number of animals reported as used by animal type and project purpose

Animal Type	Educational objectives	Environmental objectives	Improve animal management/ production	Maintenance/ improvement human/animal health/welfare	Understand human/animal biology	**Total**
*Guinea pig (lab)	106	0	0	4,293	44	**4,443**
*Macaques	0	0	0	47	29	**76**
*Marmosets	8	0	0	12	51	**71**
*Mouse (lab)	27,453	0	6,141	125,420	279,501	**438,515**
*Primates other	0	0	0	1	0	**1**
*Rabbit (lab)	54	0	0	1,140	176	**1,370**
*Rat (lab)	628	0	494	4,569	8,295	**13,986**
Amphibians	201	12,225	219	30	1,825	**14,500**
Bird exotic captive	50	0	0	30	0	**80**
Bird exotic wild	0	334	0	240	20	**594**
Bird native captive	30	884	36	24	489	**1,463**
Bird native wild	31	47,394	0	34	2,248	**49,707**
Bird other	30	750	0	248	242	**1,270**
Cats (non-wild)	107	7	0	392	20	**526**
Cats (wild)	0	127	0	0	0	**127**
Cattle (domestic)	1,257	12	2,989	940	100	**5,298**
Cephalopods	0	102	81	0	0	**183**
Crustaceans	2,026	49,171	10,015	0	890	**62,102**

Animal Type	Educational objectives	Environmental objectives	Improve animal management/ production	Maintenance/ improvement human/animal health/welfare	Understand human/animal biology	**Total**
Dasyurids	116	1,421	7	0	0	**1,544**
Deer (domestic)	0	0	0	259	0	**259**
Dogs (non-wild)	2,151	780	17	229	100	**3,277**
Dogs, foxes (wild)	0	632	0	0	0	**632**
Exotic feral mammal other	0	168	0	20	0	**188**
Exotic Zoo mammal	0	0	0	19	0	**19**
Ferret (lab)	0	0	0	378	251	**629**
Fish	525	192,905	13,797	1,191	65,878	**274,296**
Goats (domestic)	21	0	0	420	0	**441**
Goats (wild)	0	1	0	0	0	**1**
Hares (wild)	0	10	0	0	0	**10**
Horses (domestic)	199	0	0	125	13	**337**
Horses (wild)	0	77	0	0	0	**77**
Koalas	0	117	0	12	0	**129**
Laboratory mammal (non-specified)	0	0	0	124	9	**133**
Lizards	56	1,831	1,610	288	429	**4,214**
Macropods	2	2,396	0	370	68	**2,836**
Mice (wild)	20	1,318	197	0	8	**1,543**

Animal Type	Educational objectives	Environmental objectives	Improve animal management/ production	Maintenance/ improvement human/animal health/welfare	Understand human/animal biology	**Total**
Monotremes	0	275	0	1	15	**291**
Native mammal other	20	10,801	10	84	258	**11,173**
Native Rats, Mice	182	3,140	0	0	0	**3,322**
Other domestic mammals	46	0	0	0	3	**49**
Pigs (domestic)	8	0	1,024	60	75	**1,167**
Pigs (wild)	0	8	0	0	0	**8**
Possums, Gliders	45	1,776	124	30	0	**1,975**
Poultry	270	0	740,974	8,370	2,560	**752,174**
Rabbits (wild)	11	70	0	0	0	**81**
Rats (wild)	3	247	0	0	1	**251**
Reptile other	0	219	0	0	0	**219**
Seals, Sealions	0	122	0	0	30	**152**
Sheep (domestic)	16,307	75	40,557	6,432	397	**63,768**
Snakes	2	117	46	54	20	**239**
Tortoises/ turtle	0	622	0	2	0	**624**
Whales, dolphins	0	55	0	0	5	**60**
Wombats	0	208	0	0	0	**208**
Total	**51,965**	**330,397**	**818,338**	**155,888**	**364,050**	**1,720,638**

**Specified animals.*

Table 2.3 Number of non-specified animals used by animal type by source

Animal Type	Animals in their natural habitat	Australian captive colony/zoo	Commercial supplier	Municipal pound	Other source	Own derivation	Private companion animals	Private donation	Privately owned animals on a farm	Removed from Aust. natural habitat	**Total**
Amphibians	11,899	779	189	0	0	255	1	0	0	1,377	**14,500**
Bird exotic captive	0	0	80	0	0	0	0	0	0	0	**80**
Bird exotic wild	412	0	0	0	13	0	0	0	0	169	**594**
Bird native captive	818	123	34	0	0	484	0	0	4	0	**1,463**
Bird native wild	49,707	0	0	0	0	0	0	0	0	0	**49,707**
Bird other	992	0	248	0	30	0	0	0	0	0	**1,270**
Cats (non-wild)	55	0	33	13	328	0	97	0	0	0	**526**
Cats (wild)	127	0	0	0	0	0	0	0	0	0	**127**
Cattle (domestic)	0	0	723	0	1,025	1,305	0	0	2,245	0	**5,298**
Cephalopods	183	0	0	0	0	0	0	0	0	0	**183**
Crustaceans	59,620	0	890	0	0	0	0	0	0	1,592	**62,102**
Dasyurids	1,370	174	0	0	0	0	0	0	0	0	**1,544**
Deer (domestic)	259	0	0	0	0	0	0	0	0	0	**259**
Dogs (non-wild)	759	1	6	0	101	0	2,410	0	0	0	**3,277**
Dogs, foxes (wild)	632	0	0	0	0	0	0	0	0	0	**632**
Exotic feral mammal other	168	0	0	0	0	20	0	0	0	0	**188**
Exotic Zoo mammal	0	19	0	0	0	0	0	0	0	0	**19**
Ferret (lab)	0	0	586	0	43	0	0	0	0	0	**629**
Fish	191,226	166	9,537	0	0	70,235	0	0	0	3,132	**274,296**

Animal Type	Animals in their natural habitat	Australian captive colony/zoo	Commercial supplier	Municipal pound	Other source	Own derivation	Private companion animals	Private donation	Privately owned animals on a farm	Removed from Aust. natural habitat	**Total**
Goats (domestic)	0	0	0	0	11	0	10	0	420	0	**441**
Goats (wild)	1	0	0	0	0	0	0	0	0	0	**1**
Hares (wild)	10	0	0	0	0	0	0	0	0	0	**10**
Horses (domestic)	0	0	111	0	67	7	13	65	74	0	**337**
Horses (wild)	77	0	0	0	0	0	0	0	0	0	**77**
Koalas	129	0	0	0	0	0	0	0	0	0	**129**
Laboratory mammal (non-specified)	0	0	0	0	0	133	0	0	0	0	**133**
Lizards	3,977	12	0	0	0	0	45	0	0	180	**4,214**
Macropods	2,768	0	0	0	0	68	0	0	0	0	**2,836**
Mice (wild)	1,543	0	0	0	0	0	0	0	0	0	**1,543**
Monotremes	286	5	0	0	0	0	0	0	0	0	**291**
Native mammal other	10,723	308	0	0	0	0	0	0	0	142	**11,173**
Native Rats, Mice	3,322	0	0	0	0	0	0	0	0	0	**3,322**
Other domestic mammals	0	0	0	0	13	0	36	0	0	0	**49**
Pigs (domestic)	0	0	417	0	0	750	0	0	0	0	**1,167**
Pigs (wild)	8	0	0	0	0	0	0	0	0	0	**8**
Possums, Gliders	1,975	0	0	0	0	0	0	0	0	0	**1,975**
Poultry	0	0	745,044	0	29	7,043	58	0	0	0	**752,174**
Rabbits (wild)	71	0	0	0	0	0	10	0	0	0	**81**
Rats (wild)	251	0	0	0	0	0	0	0	0	0	**251**

Animal Type	Animals in their natural habitat	Australian captive colony/zoo	Commercial supplier	Municipal pound	Other source	Own derivation	Private companion animals	Private donation	Privately owned animals on a farm	Removed from Aust. natural habitat	**Total**
Reptile other	219	0	0	0	0	0	0	0	0	0	**219**
Seals, Sealions	152	0	0	0	0	0	0	0	0	0	**152**
Sheep (domestic)	0	0	1,629	0	106	1,665	0	20	60,348	0	**63,768**
Snakes	237	0	0	0	0	0	2	0	0	0	**239**
Tortoises/ turtle	622	0	0	0	0	0	0	0	0	2	**624**
Whales, dolphins	60	0	0	0	0	0	0	0	0	0	**60**
Wombats	208	0	0	0	0	0	0	0	0	0	**208**
Total	**344,866**	**1,587**	**759,527**	**13**	**1,766**	**81,965**	**2,682**	**85**	**63,091**	**6,594**	**1,262,176**

Table 2.4 Number of specified animals used by animal type by source

Animal Type	*Other	*Own Derivation	*Imported from overseas	*Victoria – Specified Animals Breeding Licenced Supplier	*Interstate institution authorised to distribute specified animals	**Total**
*Guinea pig (lab)	25	4,307	0	54	57	**4,443**
*Macaques	0	0	0	0	76	**76**
*Marmosets	0	0	0	0	71	**71**
*Mouse (lab)	792	274,313	3,000	101,826	58,584	**438,515**
*Rabbit (lab)	24	1,024	0	313	9	**1,370**
*Rat (lab)	169	6,231	4	2,995	4,587	**13,986**
*Primates other	1	0	0	0	0	**1**
Total	**1,011**	**285,875**	**3,004**	**105,188**	**63,384**	**458,462**

**Specified animals.*

2.2 Reported by project benefit

Table 2.5 Number of animals reported as used by animal type, by project benefits

Animal Type	Development of techniques	Domestic animal management/ production	Education (demonstration)	Environmental monitoring/ecology	Fundamental biology/physiology	Production of biological products	Regulatory product testing	Training (student use of animals)	Vertebrate pest management	Wildlife management/ conservation	Diseases-animal	Diseases-zoonotic	Diseases-human	**Total**
*Guinea pig (lab)	65	0	52	0	44	40	3,958	54	0	0	24	0	206	**4,443**
*Macaques	0	0	0	0	3	23	0	0	0	0	0	0	50	**76**
*Marmosets	0	0	0	0	41	0	0	8	0	0	0	0	22	**71**
*Mouse (lab)	351	10,866	464	0	151,040	1,538	30,967	26,989	100	0	7,582	1,407	207,211	**438,515**
*Primates other	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
*Rabbit (lab)	3	0	15	0	0	246	841	39	0	0	24	0	202	**1,370**
*Rat (lab)	18	444	141	0	3,584	33	72	487	0	0	296	0	8,911	**13,986**
Amphibians	0	0	128	8,833	478	0	0	73	2,682	1,280	996	0	30	**14,500**
Bird exotic captive	30	0	0	0	0	0	0	50	0	0	0	0	0	**80**
Bird exotic wild	0	0	0	0	20	0	0	0	64	328	182	0	0	**594**
Bird native captive	4	0	0	0	489	0	0	30	0	928	12	0	0	**1,463**
Bird native wild	0	0	1	37,750	1,032	0	0	30	0	10,805	0	89	0	**49,707**
Bird other	0	0	10	56	186	58	0	20	0	750	0	175	15	**1,270**
Cats (non-wild)	0	368	4	0	2	0	0	103	0	0	16	0	33	**526**
Cats (wild)	0	0	0	5	0	0	0	0	5	117	0	0	0	**127**
Cattle (domestic)	102	2,852	297	12	0	0	669	960	0	0	406	0	0	**5,298**
Cephalopods	0	0	0	102	0	0	0	0	0	81	0	0	0	**183**
Crustaceans	0	0	2,026	49,140	0	0	0	0	0	10,046	890	0	0	**62,102**

Animal Type	Development of techniques	Domestic animal management/ production	Education (demonstration)	Environmental monitoring/ecology	Fundamental biology/physiology	Production of biological products	Regulatory product testing	Training (student use of animals)	Vertebrate pest management	Wildlife management/ conservation	Diseases-animal	Diseases-zoonotic	Diseases-human	**Total**
Dasyurids	0	0	5	175	0	0	0	111	0	1,079	174	0	0	**1,544**
Deer (domestic)	0	0	0	0	0	0	0	0	259	0	0	0	0	**259**
Dogs (non-wild)	28	134	21	7	50	0	1	2,130	0	768	131	0	7	**3,277**
Dogs, foxes (wild)	0	0	0	44	0	0	0	0	0	588	0	0	0	**632**
Exotic feral mammal other	0	0	0	113	0	0	0	0	0	55	0	0	20	**188**
Exotic Zoo mammal	19	0	0	0	0	0	0	0	0	0	0	0	0	**19**
Ferret (lab)	15	0	0	0	40	66	0	0	0	0	0	218	290	**629**
Fish	299	8,388	296	176,800	60,816	0	0	229	0	22,146	574	0	4,748	**274,296**
Goats (domestic)	0	0	0	0	0	0	0	21	0	0	0	420	0	**441**
Goats (wild)	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
Hares (wild)	0	0	0	0	0	0	0	0	0	10	0	0	0	**10**
Horses (domestic)	6	16	0	0	0	39	10	199	0	0	64	0	3	**337**
Horses (wild)	0	0	0	77	0	0	0	0	0	0	0	0	0	**77**
Koalas	0	0	0	23	0	0	0	0	0	106	0	0	0	**129**
Laboratory mammal (non-specified)	0	0	0	0	9	0	0	0	0	0	0	0	124	**133**
Lizards	0	0	10	1,770	168	0	0	46	0	2,220	0	0	0	**4,214**
Macropods	0	0	2	636	68	0	0	0	0	1,830	300	0	0	**2,836**
Mice (wild)	0	0	2	319	0	0	0	18	123	1,073	0	8	0	**1,543**

Animal Type	Development of techniques	Domestic animal management/ production	Education (demonstration)	Environmental monitoring/ecology	Fundamental biology/physiology	Production of biological products	Regulatory product testing	Training (student use of animals)	Vertebrate pest management	Wildlife management/ conservation	Diseases-animal	Diseases-zoonotic	Diseases-human	**Total**
Monotremes	0	0	0	36	0	0	0	0	0	255	0	0	0	**291**
Native mammal other	0	0	20	7,229	258	0	0	0	0	3,666	0	0	0	**11,173**
Native Rats, Mice	0	0	1	1,527	0	0	0	181	0	1,613	0	0	0	**3,322**
Other domestic mammals	0	0	0	0	3	0	0	46	0	0	0	0	0	**49**
Pigs (domestic)	73	806	0	0	202	0	34	8	0	0	28	12	4	**1,167**
Pigs (wild)	0	0	0	8	0	0	0	0	0	0	0	0	0	**8**
Possums, Gliders	0	0	13	497	0	0	0	32	0	1,403	30	0	0	**1,975**
Poultry	0	107,266	0	0	2,504	1,771	632,695	270	0	0	1,677	5,353	638	**752,174**
Rabbits (wild)	0	0	1	15	0	0	0	10	0	55	0	0	0	**81**
Rats (wild)	0	0	3	96	0	0	0	0	0	151	0	1	0	**251**
Reptile other	0	0	0	0	0	0	0	0	0	219	0	0	0	**219**
Seals, Sealions	0	0	0	42	0	0	0	0	0	110	0	0	0	**152**
Sheep (domestic)	32	43,770	14,479	75	574	18	1,377	1,828	0	0	169	0	1,446	**63,768**
Snakes	0	0	0	128	0	0	0	2	0	109	0	0	0	**239**
Tortoises/ turtle	0	0	0	426	0	0	0	0	0	198	0	0	0	**624**
Whales, dolphins	0	0	0	0	0	0	0	0	0	60	0	0	0	**60**
Wombats	0	0	0	123	0	0	0	0	0	85	0	0	0	**208**
Total	**1,045**	**174,910**	**17,991**	**286,065**	**221,611**	**3,832**	**670,624**	**33,974**	**3,233**	**62,135**	**13,575**	**7,683**	**223,960**	**1,720,638**

**Specified animals.*

Table 2.6 Number of animals used, by project impact by project benefit

Project Impact	Development of techniques	Domestic animal management/ production	Education (demonstration)	Environmental monitoring/ecology	Fundamental biology/physiology	Production of biological products	Regulatory product testing	Training (student use of animals)	Vertebrate pest management	Wildlife management/ conservation	Diseases-animal	Diseases-zoonotic	Diseases-human	**Total**
Observational study involving minor interference	252	141,924	15,717	82,542	49,448	496	841	4,664	347	21,712	1,283	595	21,695	**341,516**
Animal unconscious without recovery	522	28	430	651	42,421	65	1,110	883	2,881	133	980	0	40,380	**90,484**
Minor conscious intervention	42	28,479	1,781	182,876	49,082	86	20,304	26,538	0	29,694	7,071	5,677	50,605	**402,235**
Minor operative procedures with recovery	12	3,170	1	315	7,315	106	1	1,569	5	405	454	0	14,599	**27,952**
Minor physiological challenge	181	898	50	19,525	38,319	1,457	632,830	229	0	10,128	864	60	36,914	**741,455**
Surgery with recovery	36	55	12	156	7,389	40	0	39	0	15	334	0	17,727	**25,803**
Moderate to major physiological challenge	0	356	0	0	27,637	1,582	10,122	52	0	48	2,589	1,351	42,040	**85,777**
Death as an end point	0	0	0	0	0	0	5,416	0	0	0	0	0	0	**5,416**
Total	**1,045**	**174,910**	**17,991**	**286,065**	**221,611**	**3,832**	**670,624**	**33,974**	**3,233**	**62,135**	**13,575**	**7,683**	**223,960**	**1,720,638**

Table 2.7 Number of animals reported as used by project purpose

Project purpose	Number of animals
Educational objectives	51,965
Environmental objectives	330,397
Improve animal management/production	818,338
Maintenance/improvement human/animal health/welfare	155,888
Understand human/animal biology	364,050
Total	**1,720,638**

2.3 Number of animals used and animal deaths

Investigators must plan for animals at the conclusion of a project. If appropriate, animals are returned to normal husbandry conditions or their natural habitat. When results rely on tissue analysis, this usually requires the humane killing of the animals. Opportunities to rehome animals that are not needed for tissue analysis are considered wherever possible. Under certain conditions, with special justification, an AEC may approve an animal to be used in a subsequent project.

Table 2.8 Number of animals used and deaths by type

Animal type	Number of animals	Number of deaths
*Guinea pig (lab)	4,443	4,347
*Macaques	76	37
*Marmosets	71	36
*Mouse (lab)	438,515	380,668
*Primates other	1	0
*Rabbit (lab)	1,370	1,277
*Rat (lab)	13,986	13,209
Amphibians	14,500	4,121
Bird exotic captive	80	30
Bird exotic wild	594	188
Bird native captive	1,463	142
Bird native wild	49,707	11
Bird other	1,270	20
Cats (non-wild)	526	9
Cats (wild)	127	2
Cattle (domestic)	5,298	35
Cephalopods	183	4
Crustaceans	62,102	1,117
Dasyurids	1,544	9
Deer (domestic)	259	0
Dogs (non-wild)	3,277	0
Dogs, foxes (wild)	632	0
Exotic feral mammal other	188	20
Exotic Zoo mammal	19	0
Ferret (lab)	629	368
Fish	274,296	45,486
Goats (domestic)	441	0
Goats (wild)	1	0
Hares (wild)	10	0
Horses (domestic)	337	4
Horses (wild)	77	0
Koalas	129	2

Animal type	Number of animals	Number of deaths
Laboratory mammal (non-specified)	133	133
Lizards	4,214	249
Macropods	2,836	87
Mice (wild)	1,543	111
Monotremes	291	0
Native mammal other	11,173	172
Native Rats, Mice	3,322	1
Other domestic mammals	49	5
Pigs (domestic)	1,167	436
Pigs (wild)	8	1
Possums, Gliders	1,975	0
Poultry	752,174	14,551
Rabbits (wild)	81	0
Rats (wild)	251	1
Reptile other	219	15
Seals, Sealions	152	0
Sheep (domestic)	63,768	1,953
Snakes	239	0
Tortoises/ turtle	624	28
Whales, dolphins	60	0
Wombats	208	0
Total	**1,720,638**	**468,885**

**Specified animals.*

Part 3: Animal use statistics from 2012 to 2021

3.1 Number of animals used in research, teaching and testing from 2012 – 2021

The number of animals used in research, teaching and testing in 2021 was 1,720,638.

Figure 3.1 Number of animals used, 2012 – 2021

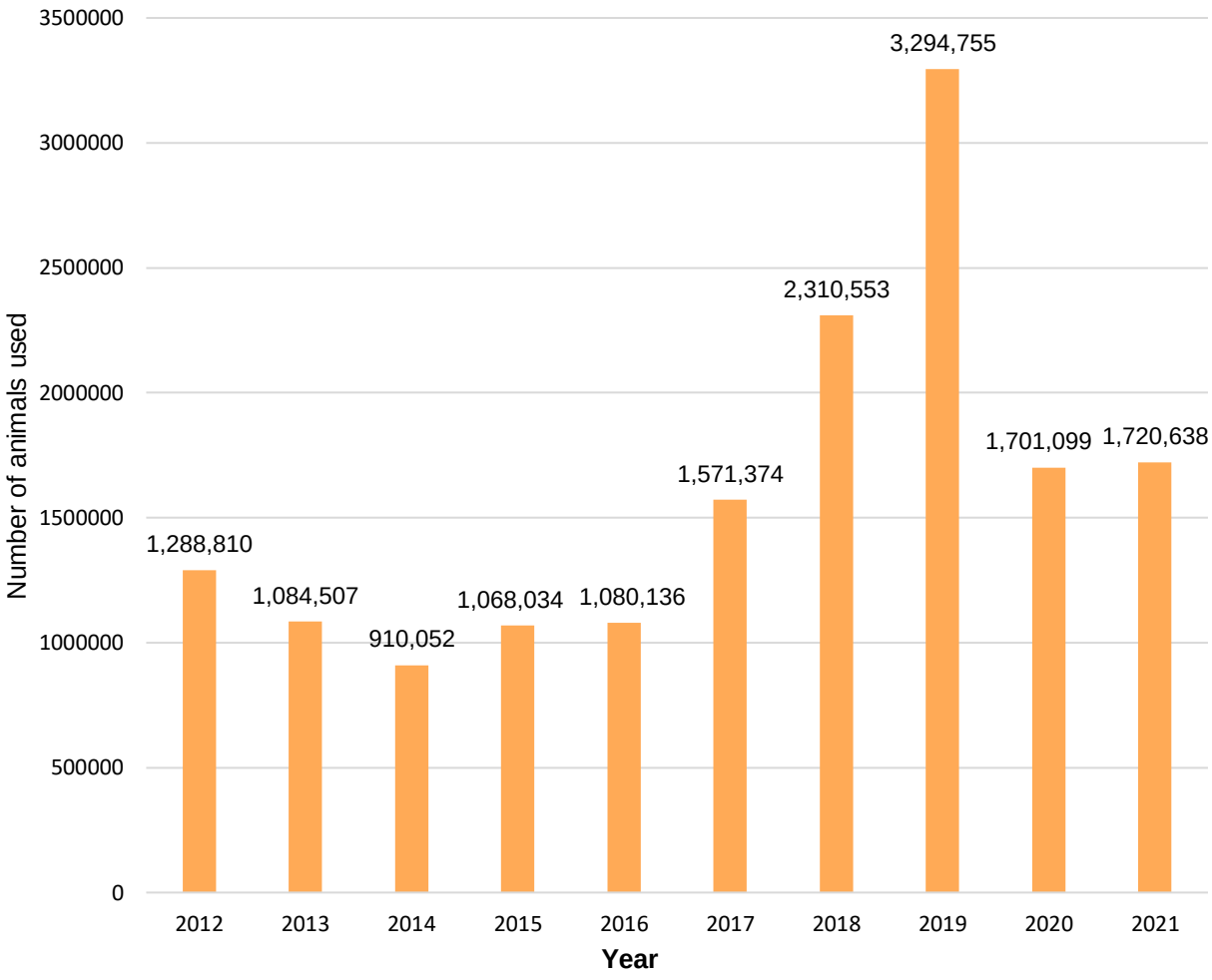


Figure 3.2 Percentage of animals used by project purpose, 2017 – 2021

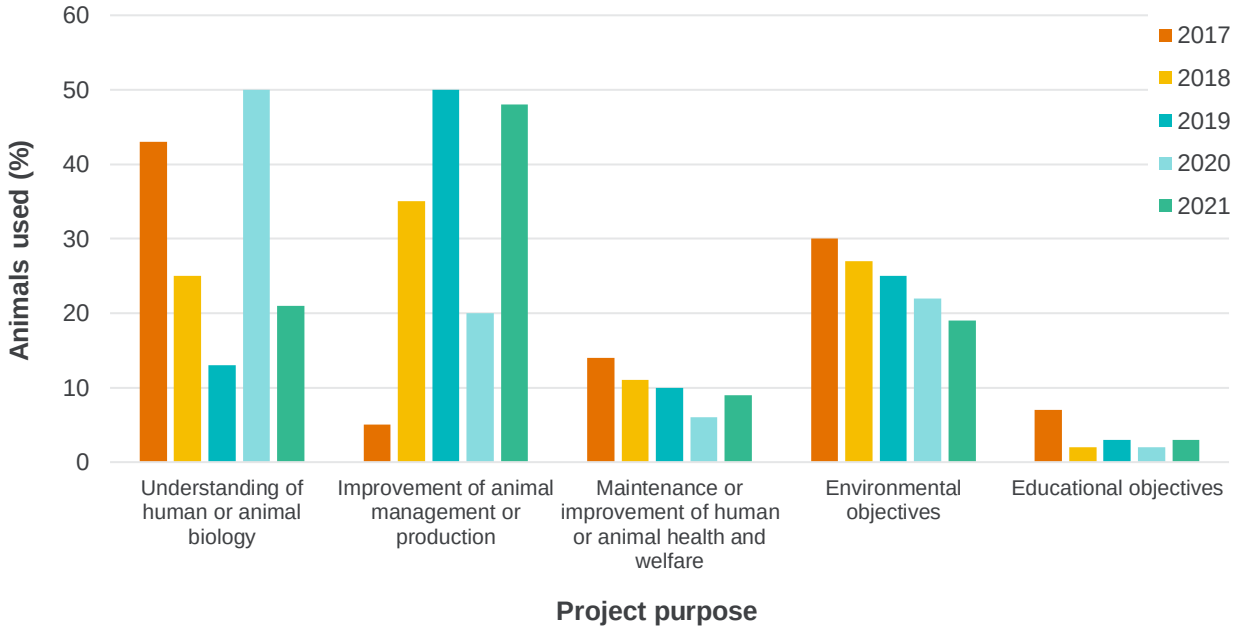
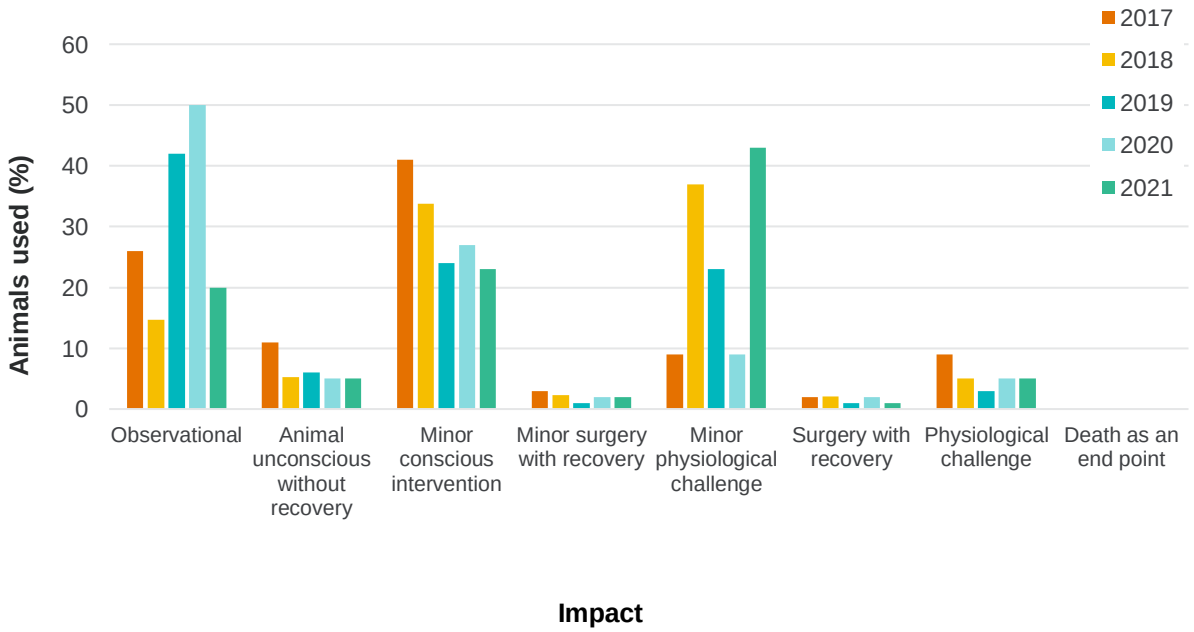


Figure 3.3 Percentage of animals used by impact type, 2017 – 2021



3.2 Number of specified animals used from 2012 – 2021

Figure 3.4 Number of specified mice used, 2012 – 2021

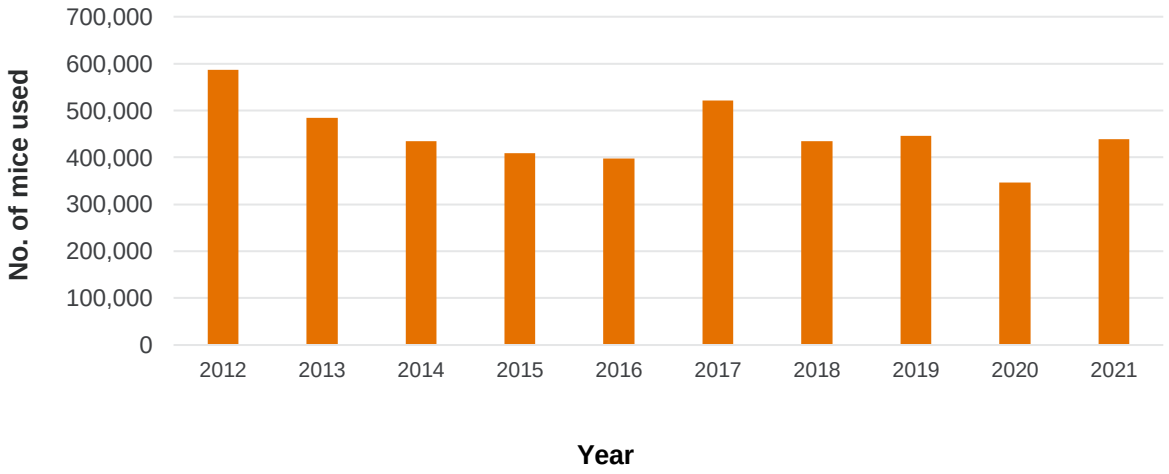


Figure 3.5 Number of specified animals, excluding mice and non-human primates 2012-2021

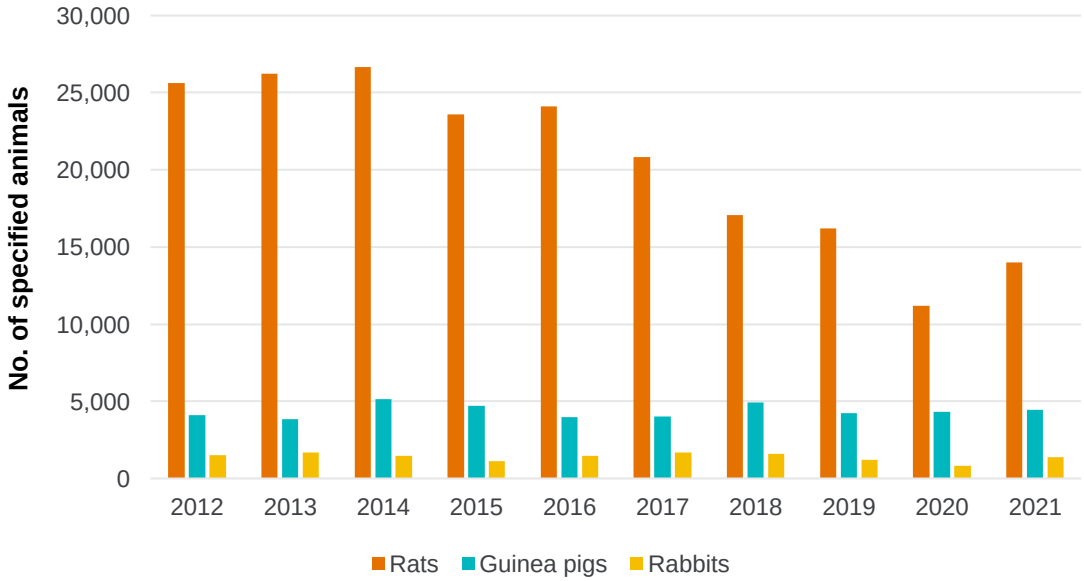


Figure 3.6 Number of non-human primates, 2012 - 2021

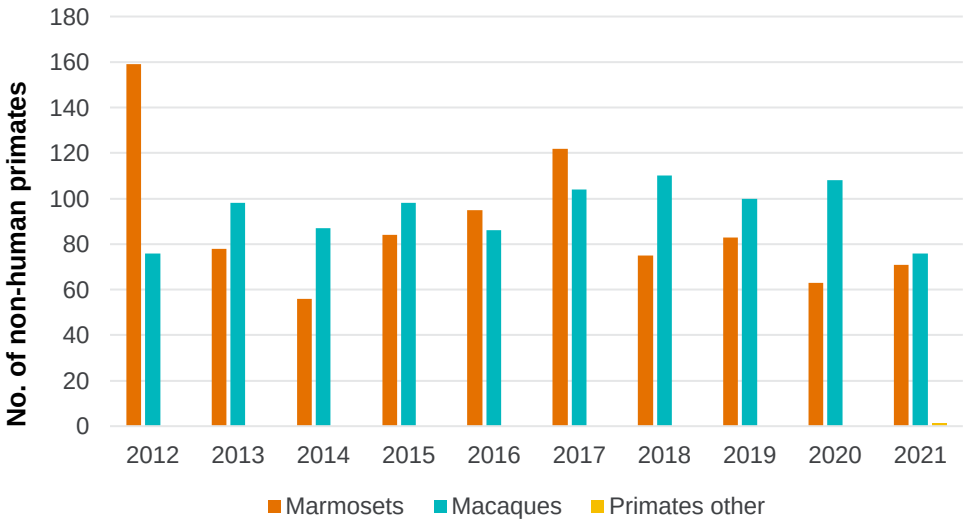
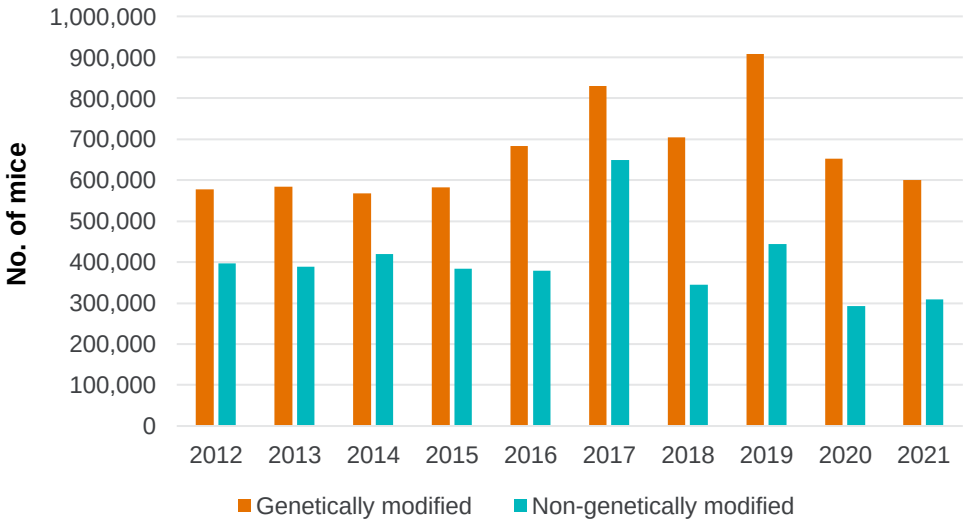


Figure 3.7 Number of specified mice in breeding colonies, 2012 – 2021



3.3 Number of animals used in breeding colonies from 2012 – 2021

Table 3.1 Number of non-genetically modified specified animals in breeding colonies by animal type, 2012 – 2021

Animal type	Year									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Guinea pigs	320	244	345	294	96	48	3,202	1,543	1,207	2,183
Macaques	244	226	263	282	274	476	258	271	175	158
Marmosets	146	273	305	440	463	744	309	228	231	210
Mice	396,710	389,049	420,126	384,762	379,198	649,519	345,107	444,733	292,840	309,679
Rabbits	214	197	133	179	159	86	793	46	531	540
Rats	31,886	33,308	25,546	23,744	27,754	40,719	20,606	28,319	24,089	30,040
Total	**429,520**	**423,297**	**446,718**	**409,701**	**407,944**	**691,592**	**370,275**	**475,140**	**319,073**	**342,810**

Table 3.2 Number of genetically modified specified animals in breeding colonies by animal type, 2012 – 2021

Animal type	Year									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Mice	578,240	584,660	568,495	582,925	683,769	829,940	704,297	908,083	652,671	600,716
Rats	1,381	1,992	4,271	2,714	2,286	2,907	2,160	2,073	1,408	1,570
Total	**579,621**	**586,652**	**572,766**	**585,639**	**686,055**	**832,847**	**706,457**	**910,156**	**654,079**	**602,286**

In 2020 a new reporting category was introduced, to capture non-specified animals in breeding colonies. This was designed to improve data accuracy for these animals. Previously, these animals may have been reported as domestic animal management/production.

Table 3.3 Number of non-genetically modified non-specified animals in breeding colonies by animal type, 2020-2021

Animal type	2020	2021
Amphibians	274	287
Bird native captive	0	31
Cats (non-wild)	21	58
Cattle (domestic)	338	0
Dasyurids	8	0
Exotic feral mammal other	393	99
Fish	87,636	38,340
Horses (domestic)	19	52
Macropods	53	100
Poultry	52	337
Reptile other	0	12
Sheep (domestic)	1,136	230
Laboratory mammal (non-specified)	344	707
Total	**90,274**	**40,253**

Table 3.4 Number of genetically modified non-specified animals in breeding colonies by animal type, 2020-2021

Animal type	2020	2021
Amphibians	175	67
Bird other	34	0
Fish	59,248	196,335
Pigs (domestic)	55	0
Poultry	270	441
Total	**59,782**	**196,843**

4 Appendices

Appendix 1

Table 4.1 Reporting categories

Category	Description
Observation involving minor interference	Studies in which the normal activities of animals are minimally impacted on. For example, laboratory animals held in cages for acclimatisation; a feeding trial, such as Digestible Energy determination of feed in a balanced diet; behavioural or growth study with minor environmental manipulation; or teaching of normal, non-invasive husbandry such as handling, grooming, etc.
Unconscious without recovery	Studies in which animals are humanely rendered unconscious under controlled circumstances (i.e. not in a field situation) with as little pain or distress as possible. Capture methods are not required. Any pain is minor and brief and does not require analgesia. Procedures are carried out on the unconscious animal that is then killed without regaining consciousness. Examples include animals (including fish) in laboratory killed painlessly for dissection, biochemical analysis, etc.; or teaching of surgical techniques using live, anaesthetised patients that are not allowed to recover following the procedure.
Minor conscious intervention	Studies in which animals are subjected to minor procedures that would normally not require anaesthesia. Any pain is minor, although some distress may occur as a result of trapping or handling. For example, capture and release (with or without tagging) of animals (including fish) in the wild; trapping and humane euthanasia for collection of specimens; ear notching for identification of new line GM animals; injections, blood sampling in conscious animal; minor dietary or environmental deprivation or manipulation, such as feeding nutrient-deficient diets for short periods; or stomach tubing, branding, disbudding, shearing, etc.
Minor operative procedure with recovery	Studies in which animals are anaesthetised for a minor procedure such as cannulation or skin biopsy. Animals are allowed to recover. Depending on the procedure, pain may be minor or moderate and post-operative analgesia may be appropriate. For example, biopsies or blood sampling under anaesthesia or sedation; cannulations under anaesthesia or sedation; sedation/anaesthesia for relocation, examination or injections/blood sampling; field capture using chemical restraint methods.

Category	Description
Minor physiological challenge	Studies in which there is interference with the animals' physiological or psychological processes. The challenge may cause mild or short-lived pain/distress, or any pain/distress is quickly and effectively alleviated. For example, electrofishing; minor infection, minor or moderate phenotypic modification, early oncogenesis; arthritis studies with pain alleviation; prolonged deficient diets, induction of metabolic disease; polyclonal antibody production; or antiserum production.
Surgery with recovery	Studies in which animals are anaesthetised for a major procedure such as abdominal or orthopaedic surgery following which the animal is allowed to recover. Post-operative pain should be managed with analgesia. For example, orthopaedic surgery; abdominal or thoracic surgery; transplant surgery; or surgery under anaesthesia for implantation of telemetry tags.
Moderate to major physiological challenge	Studies in which there is interference with the animals' physiological or psychological processes. The procedure/s may cause moderate or longer lasting pain/distress. Pain or distress may not be able to be entirely alleviated, either due to the nature of the process (e.g., neurological impairment) or because of the experimental question (e.g., pain studies). Other examples include: severe infection, significant disability due to genetic modification, induction of cancer without pain alleviation; arthritis studies without pain alleviation, uncontrolled metabolic disease; isolation or environmental deprivation for extended periods.
Death as an endpoint	Studies where the death of the animal is essential for the scientific result, such as for efficacy of some antivenoms, development of pest control agents and studies of acutely fatal conditions. In these studies, death is a deliberate measure in the procedure and there can be no intervention to kill the animal humanely before death occurs in the course of the procedure. 'Death as an endpoint' procedures must be approved by the Minister for Agriculture. They do not include studies where animals are humanely killed at the conclusion of the experiment.