Ministry for Primary Industries
Manatū Ahu Matua

Statistics on the Use of Animals in Research, Testing and Teaching in New Zealand in 2016

June 2018

New Zealand Government

Disclaimer

While every effort has been made to ensure the information is accurate, the Ministry for Primary Industries does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information. Any view or opinion expressed does not necessarily represent the view of the Ministry for Primary Industries.

Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

This publication is also available on the Ministry for Primary Industries website at
http://www.mpi.govt.nz/news-and-resources/publications/

© Crown Copyright - Ministry for Primary Industries

Contents

1 Executive summary

This report presents numbers of animals used in research, testing and teaching (RTT) studies in New Zealand that were completed and reported to MPI in 2016. Numbers of animals used in long-term projects are not reported annually but either every three years or at the end of the year in which the project is completed, if less than three years.

Any RTT activities involving animals in New Zealand can only be carried out under the strict requirements of the Animal Welfare Act 1999 and its amendments. No animal manipulations can be carried out without the prior approval of an animal ethics committee (AEC), membership of which must include at least three independent members: one a veterinarian, one a member of the RNZSPCA and one from a local territorial authority. The AEC is tasked with assessing the necessity for any RTT activities, including weighing up the potential benefits against the cost to animal welfare. In addition, the AEC must be confident that researchers have fully addressed the Three Rs – replacement of animals with non-sentient or less sentient alternatives; reduction in animal numbers to the minimum required for statistical significance; and refinement of procedures to ensure the minimum possible impact on animal welfare.

A range of animals are used in research, testing and teaching (RTT), as described in this report. However, New Zealand is perhaps unusual in that the majority of animals used for RTT are agricultural animals. For example, in 2016 nearly 65 percent of the total of 254 453 animals reported to MPI were farm animals. Because New Zealand's economy is largely based around its agricultural industries, scientific innovation and good animal husbandry are major reasons for the success of this sector. As an example, in 2016 the majority of animals used for teaching purposes were farm animals, with a focus on maximising their appropriate treatment and handling. In addition nearly 40 percent of farm animals were used in low level animal husbandry and veterinary research, to ensure appropriate and efficient management of livestock. Ninety-eight percent of farm animals used for RTT returned to their normal lives following their temporary use as research animals.

Some research, however, does have a greater impact on animals. Efforts to find the most humane methods of pest control, for instance, can carry a relatively high welfare cost. As an example, researchers may need to measure the length of time from ingestion of a poison until an animal is unconscious or dead in order to ascertain the efficiency or otherwise of that method of pest control. Such activities may cause considerable distress, and these are the type of issues that AEC members are required to weigh very carefully against the benefits of improving the survivability of our vulnerable native wildlife populations. Details of RTT activities that are graded as having a high or very high impact on animal welfare are given later in the report, along with examples of research that advances the Three Rs – animal replacement, reduction and refinement.

2 Introduction

The use of animals in research, testing and teaching is covered by a self-contained set of provisions within New Zealand's animal welfare legislation - Part 6 of the Animal Welfare Act 1999. This is because the nature of such use of animals may mean that general obligations under the legislation cannot be met. This recognises that compromised care and some pain and distress to a small number of animals may result in significant benefits to people, other animals or the environment. However, such use carries with it significant responsibilities and strict legislative obligations. Part 6 allows the use of animals for research, testing and teaching purposes only in accordance with a code of ethical conduct which has been approved by the Ministry for Primary Industries. In 2016, 26 institutions had codes of ethical conduct approved by the Director-General of the Ministry for Primary Industries. These codes set the parameters within which the institutions are allowed to use animals for research, testing and teaching purposes. Code holders undergo review by an accredited reviewer at least once every five years.

Each project must also be scrutinised and approved by an animal ethics committee (AEC) established under the code of ethical conduct. There are currently 30 animal ethics committees (some institutions, because of their geographic spread, operate more than one committee). In addition, another 109 institutions engaging in research, testing and teaching involving animals had an arrangement to use another institution's AEC rather than forming their own. The membership of each AEC must include at least one senior staff member of the institution and at least three people with no other association with the institution carrying out the research. These external members must include a nominee from each of the New Zealand Veterinary Association, the Royal New Zealand SPCA and a local or regional council. The AEC's role is to decide whether or not to approve projects, to set, vary or revoke conditions of project approvals, to monitor compliance with conditions of project approvals and to monitor animal management practices and facilities to ensure compliance with the terms of the organisation's code of ethical conduct.

When considering applications for project approvals, AECs must have regard to a number of criteria specified in the Act including:
- the scientific or educational objectives of the project;
- the harm to or distress felt by the animals and the extent to which that can be alleviated;
- whether the design of the experiment or demonstration is such that it is reasonable to expect the objectives will be met;
- the factors taken into account in the choice of species;
- whether the number of animals is the minimum necessary to achieve meaningful results.

In essence, AECs are required to carry out a cost-benefit analysis in deciding whether a research, testing or teaching protocol should be allowed to proceed: the higher the cost to the animal, the greater the expected benefit must be, whether that benefit be to people, to other animals or to the environment. AECs also ensure that the costs to the animal are minimised through the implementation of the "Three Rs", the internationally accepted principles of humane experimental technique. They are the *reduction* in the numbers of animals to the minimum necessary to achieve a result; the *replacement* of animals with a less sentient or non-sentient alternative wherever possible; and the *refinement* of procedures as well as of animal environments to minimise pain or distress.

Records of the annual numbers of animals used in research, testing and teaching have been collected since 1987. While previously published within the annual report of the National Animal Ethics Advisory Committee (NAEAC), animal use statistics are now produced as a stand-alone document.

All code holders are required to keep records as specified in the Animal Welfare (Records and Statistics) Regulations 1999 in a readily accessible manner. For record keeping purposes, the term "code holder" includes any person or organisation that has made arrangements to use an existing code and AEC, as well as anyone with an approval to use non-human hominids. (It should be noted that any research, testing and teaching involving non-human hominids must be in the best interests of the individual non-human hominid or its species and must be approved by the Director-General of the Ministry for Primary Industries rather than an AEC.)

The records must be retained for a period of five years after the year to which they relate, and an annual return of the figures for the previous calendar year must be submitted to the Ministry for Primary Industries by 28 February each year. In addition, the regulations empower the Director-General of MPI or any inspector appointed under the Animal Welfare Act 1999 to obtain copies of

records or details from them at any time. The regulations provide penalties for non-compliance, including for late submission of returns or supplying false or misleading figures.

Records of the number of animals used in long-term projects are not reported annually to MPI but every three years or at the end of the year in which the project is completed (if less than three years). Hence annual animal usage detailed below reflects the numbers of animals used in studies that were completed during the year and reported to MPI.

The 21 more common species used in research, testing and teaching in New Zealand are grouped into the following categories:
- Birds (fowls/chickens, "other birds", pigeons)
- Farm animals (cattle, deer, goats, pigs, sheep)
- Miscellaneous (amphibia, cephalopod/crustacea, fish, marine mammals, possums, reptiles)
- Other domestic mammals (cats, dogs, horses)
- Rabbits
- Rodents (guinea pigs, mice, rats)

A further category – "other" – covers any other species including zoo animals and wild animals.

3 Summary of 2016 Animal Use Statistics

A total of 254 453 animals used in research, testing and teaching was reported in 2016, a 12.9 percent increase (+ 29 143) over the previous year. The rolling 3-year average was 263 350, up 4.0 percent on the previous year's record low.

The most commonly reported species in 2016, as it was in 2015, was cattle, making up 63.5 percent of the farm animals used, and 41.2 percent of the total number. Sheep were the second most common species in 2016, making up 18.7 percent of the total. Mice (13.4 percent) and fish (7.7 percent) were the third and fourth most commonly used species. Reflecting the predominance of research relating to agriculture, production animals (cattle, sheep, deer, goats and pigs) made up 64.8 percent of the total, with rodents and rabbits together accounting for 18.0 percent.

Veterinary research (32.3 percent), testing (24.2 percent), production of biological agents (14.6 percent), teaching (10.6 percent) and basic biological research (10.3 percent), were the main reasons for using production animals, accounting for 151 618 animals. Nearly 90 percent of the rodents were used in medical research, testing the safety and efficacy of animal health products and basic biological research. The majority (78.5 percent) of cats, dogs and horses were used in teaching and veterinary research, with 500 horses reported used in the production of biological agents.

Nearly 84 percent of animals were exposed to manipulations which had no, virtually no, or little impact on their welfare. A total of 8596 animals (3.4 percent of the total) experienced manipulations of "high impact" or "very high impact", 2878 fewer than in 2015. The species that experienced a "very high" impact were cattle, cephalopod/crustacea, rodents, possums and one pig.

New Zealand's usage of animals classified as transgenic/chimera is low by world standards, with only 5500 (2.2 percent of the total) such animals used in 2016.

More than 75 percent of animals were returned to their normal environment following their use in manipulations. Nearly 98 percent of production animals remained alive following use. However, over 95 percent of rabbits and rodents were 'dead or euthanased' following manipulation.

Although pigs are listed as farm animals, none were used in either 2015 or 2016 for veterinary or animal husbandry research. The most common uses in 2016 were medical research (24.2 percent) and environmental management (23.6 percent).

4 Animal Usage

During 2016, a total of 254 453 animals[1] were reported as manipulated[2] in research, testing and teaching[3]. This was an increase of 12.9 percent (+ 29 143) compared to 2015 when 225 310 animals were reported.

Much of the annual variability in the statistics can be attributed to the three-yearly cycle of reporting of long-term projects. Reports of the numbers of animals used in long-term projects are not required annually but rather every three years, when the project is completed or when AEC approval of the project expires, whichever comes first. A truer reflection of overall use is given by the three-year rolling average, up just over 10 000, in 2016.

To illustrate the influence of the three-yearly reporting cycle, the accompanying graph shows the rolling three-year average compared with the annual totals. From 1999 to 2001, the rolling average was 297 417 (249 272 to 324 395); for the years 2002 to 2004 the rolling average was 276 906 (246 122 to 320 911); for the years 2005 to 2007 the rolling average was 276 123 (246 667 to 318 489); for the years 2008 to 2010 it was 293 593 (242 149 to 341 520); for the years 2011 to 2013 it was 284 337 (224 048 to 326 770); and for the last three years the rolling average was 263 350 (225 310 to 310 287).
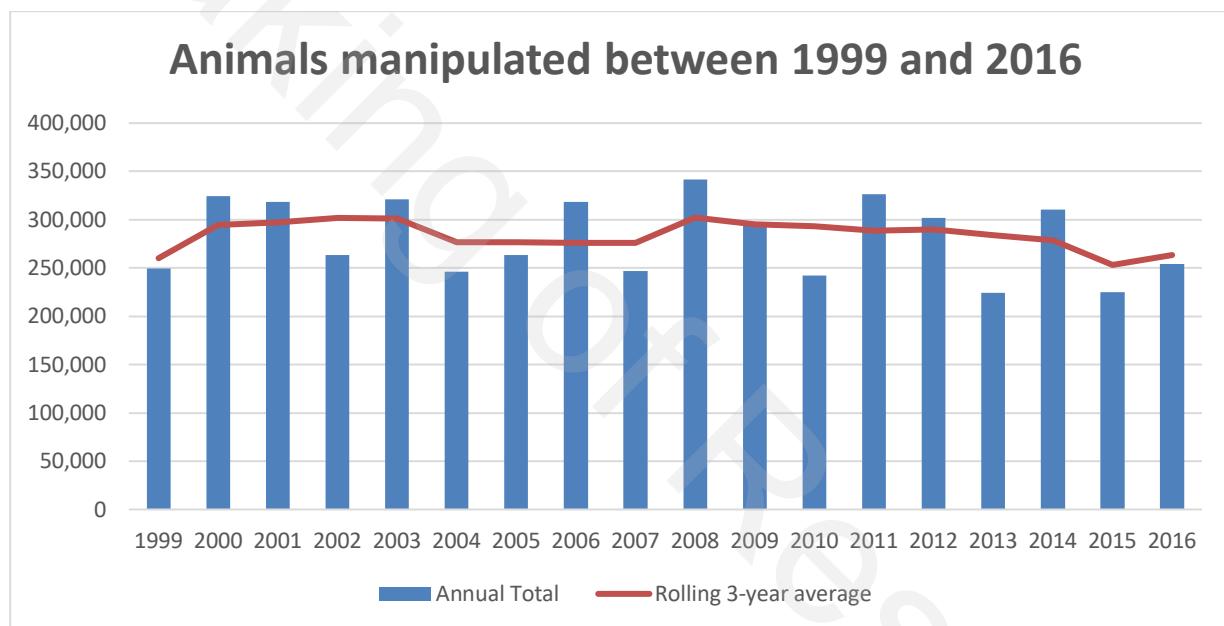
Those species most commonly reported in 2016 were (in order) cattle, sheep, mice and fish, which collectively accounted for 80.9 percent of the total animals manipulated for RTT. Mice, sheep and cattle have all been included in the four most commonly used animals since 1989. The other species making up this group in those 26 years have been fish (in 15 years), rats (in seven years) and birds (in five years).

The rise in numbers in 2016 was mainly due to increased use of farm animals and other domestic mammals. Cattle numbers rose 76.5 percent (+ 45 398), the most numerous species at 41.2 percent of the total. Sheep numbers more than doubled to 47 548 (+ 24 074), with cattle and sheep together making up nearly 60 percent of the total. Goat numbers rose by 2348 (114.4 percent); cats by 78.4 percent (+ 407); dogs by 60.6 percent (+ 492); and horses by 226.5 percent (+ 641). "Other species" where numbers rose were fowls/chickens (+ 379, a rise of 12.4 percent), pigeons (+ 28, up 12.8 percent), cephalopod/crustacea (+ 2615, a rise of 118.9 percent) and marine mammals (+ 2571, up 638.0 percent). Rodent numbers were down across the board, with the largest decrease in this group reported for mice (- 14 328, a 29.6 percent drop). Rat numbers were down 617 (a 6.6 percent drop) as were those of guinea pigs (- 67, down 3.4 percent). Rabbit numbers were also down by 269 (an 18 percent drop). The species with the largest fall numerically was fish (-21 132, a 51.8 percent drop).

---

[1] As defined in section 2(1) of the Animal Welfare Act 1999.
[2] As defined in section 3 of the Animal Welfare Act. 1999.
[3] As defined in section 5 of the Animal Welfare Act. 1999.

"Other species" with lower numbers were "other birds" (- 6318, down 51.1 percent), reptiles (- 3238, down 72.4 percent), possums (- 1808, down 60.7 percent), deer (- 809, down 9.5 percent), amphibia (- 775, down 56.7 percent), and other species (- 244, down 40.4 percent).

Overall, the use of agricultural livestock rose by 75.3 percent (+ 70 806). Cattle were again the most numerous (63.5 percent) of the agricultural livestock, with 37.8 percent being used for veterinary research, 30.1 percent for testing, 14.4 percent for teaching, 6.9 percent for basic biological research, 5.9 percent for the production of biological agents, 3.5 percent for animal husbandry research, 0.7 percent for "other purposes" and 0.6 percent for environmental management. Sheep made up 28.8 percent of agricultural livestock and were mostly used for the production of biological agents (33.4 percent), veterinary research (26.1 percent) and basic biological research (19.0 percent). Sheep were also used for testing (8.3 percent), animal husbandry (7.4 percent), teaching (4.5 percent), medical research (0.8 percent), environmental management (0.5 percent) and development of alternatives (0.1 percent). Most deer were used for testing (55.5 percent) and animal husbandry research (30.5 percent), with veterinary research accounting for 12.6 percent, teaching for 0.9 percent and basic biological research for 0.5 percent. Goats were used for the production of biological agents (46.7 percent), veterinary research (7.5 percent) and teaching (0.8 percent). Pigs were used for testing (24.4 percent), environmental management (23.6 percent), medical research (22.1 percent), basic biological research (12.9 percent, teaching (9.6 percent) and "other purposes" (7.5 percent). Although pigs are included in the "farm animal" category, none were used for veterinary or animal husbandry research.

As in 2015, rodent use also fell in 2016, down 15 012 (6.7 percent), mainly due to fewer animals being used in medical research (- 9551), testing (- 5291) and teaching (- 1187). On the other hand, more rodents were used in basic biological research (+ 1217). Mice made up the majority (76.1 percent) of rodent numbers, followed by rats (19.6 percent) and guinea pigs (4.3 percent).

As in 2015, most fish (9223, 47 percent) were used in basic biological research, but 2016 numbers were 15 434 fewer than in the previous year. Fish were also used in teaching (32.2 percent), species conservation (7.0 percent), environmental management (7 percent), animal husbandry (4.2 percent) and medical research (2.6 percent). Unlike 2015, when 5952 fish were used in veterinary research, none were reported in this category in 2016.

Bird use fell by 37.8 percent (- 5911) in 2016. This was mainly due to a more than 50 percent drop in the number of "other birds", from 12 357 to 6039, with 4984 fewer reported as used in environmental management. "Other birds" were also used for basic biological research (1225), veterinary research (987), species conservation (460), teaching (67), animal husbandry (26) and medical research (4). Numbers of fowls/chickens rose slightly (+ 379). These were used for basic biological research (1905), veterinary research (1251) and teaching (274). Pigeons (up 28) were used for basic biological research (240) and veterinary research (7).

The number of cephalopod/crustacea used in 2016 more than doubled to 4815. Most of these (82.1 percent) were used for teaching purposes, with the remainder used in basic biological research (789), environmental management (55) and animal husbandry (17). More marine mammals were reported in 2016 (+ 2571). These were used for basic biological research (62.8 percent) and species conservation (37.2 percent). In 2016, 1235 reptiles were reported compared to 4473 in 2015, a drop of 72.4 percent. The majority of these (44.2 percent) were used for basic biological research and species conservation (35.2 percent), with others used for teaching (228), veterinary research (16) and animal husbandry (10). The number of possums reported in 2016 fell 60.7 percent to 1169. Most of these (90.3 percent) were used in environmental management. The remainder were used in basic biological research (48), animal husbandry (38), veterinary research (22) and teaching (5). The numbers of amphibia fell by 775. The majority of these were used in research relating to species conservation (366) and environmental management (100), with the remainder used in basic biological research (70), animal husbandry research (33) and teaching (24).

The numbers of dogs and cats reported in 2016 both rose – dogs by 60.6 percent; cats by 78.4 percent. The majority of dogs were used for teaching (51.7 percent). Others were used for veterinary research (38.8 percent), medical research (7.5 percent), testing (1.5 percent) and environmental management (0.5 percent). Most cats were used for veterinary research (49.7 percent) and teaching (44.8 percent) with 51 used for basic biological research purposes. Horse numbers rose over 200 percent in 2016, with 500 (54.1 percent) reported as used in the production of biological agents. This species was also used for veterinary research (349), teaching (73), testing purposes (1) and other purposes (1).

The number of rabbits used fell by 269 in 2016. They were used for testing (70.0 percent), teaching (12.2 percent), basic biological research (8.3 percent), medical research (5.0 percent), veterinary research (4.3 percent) and animal husbandry research (3 rabbits).

In 2016, 360 animals were reported in the "other species" category, down from the 604 reported in 2015. This group was made up of 207 ferrets used for environmental research, 101 bats used for basic biological research (81) and species conservation (20), a variety of exotic species (32) used for medical and veterinary research, 5 llamas and 5 alpacas used in teaching, 5 hedgehogs and 3 stoats used in veterinary research, and 2 chinchillas used for teaching purposes.

Wherever it appears, the category "cats" includes feral cats. Likewise, wild rats and mice are included in the "rats" and "mice" categories and feral pigs in the "pigs" category.

5   Source of Animals

Code holders are required to report on the source of the animals manipulated according to specified categories. The table below shows the percentage of animals that came from each source in the past two years.

Source of animals	2016	2015
	%	%
Farms	52.2	37.2
Breeding units	17.7	27.5
Commercial sources	15.2	10.4
Captured	9.3	15.3
Born during project	2.8	4.1
Public sources	2.6	5.2
Imported	0.2	0.3

The higher number of animals used in 2016 was mainly reflected in those sourced from farms, with 49 151 more animals in this category. The percentage of animals sourced commercially also rose, with the majority of these also being farm animals. The percentage of animals sourced from breeding units and public sources, as well as those captured and imported into New Zealand all fell, as did the numbers in these categories.

The largest increase in numbers was in those sourced from farms, up 58.7 percent. This was mainly due to more cattle (+ 26 643), sheep (+ 22 063), goats (+ 2001), chickens (+ 1063) and horses (+ 524) being obtained from this source. Fewer fish (- 2248) and deer (-762) came from farms in 2016. Commercial enterprises were the source of 15 175 more animals in 2016, an increase of 64.9 percent. Farm animals made up 35 163 (91.2 percent) of this total. Numbers sourced from breeding units fell by 16 939 (27.3 percent) to 45 112, with rodents and rabbits accounting for 90.0 percent of these. A total of 10 772 fewer animals were captured, a decrease of 31.3 percent. These included fish (7049), "other birds" (5421), cephalopod/crustacea (4467), marine mammals (2699), possums (1160), reptiles (948), rats (723), amphibia (588), "other" species (316), mice (188), pigs (40) and rabbits (21). Fewer animals were obtained from public sources (down 43.5 percent) in 2016. Most of these (47.0 percent) were farm animals, dogs (17.2 percent) and cats (12.3 percent). Numbers of animals born during projects fell by 22.4 percent to 7178. The majority of these were sheep (2554), mice (2404), rats (743) and fish (712). Numbers of animals imported into New Zealand fell 41.5 percent to 406, made up of 367 mice, 17 rats, 16 reptiles and 6 dogs.

In 2016, 97.9 percent of farm animals were sourced from farms, commercial organisations or public sources, with a further 1.8 percent - 2554 sheep, 225 deer, 221 cattle, 31 goats and 8 pigs – born during projects. A further 314 farm animals were sourced from breeding units and 40 pigs were captured. Reflecting New Zealand's focus on agricultural research, farm animals were used by 54 organisations or individuals (hereafter referred to as organisations), 38 of which used only cattle and/or sheep.

The majority of rodents (88.6 percent) (used by 31 organisations) and rabbits (75.6 percent) (used by 19 organisations) came from breeding units. Rodents were also born during projects (7.0 percent), captured (2.0 percent), obtained from commercial sources (1.2 percent), imported (0.9 percent) and obtained from public sources (0.2 percent). Rabbits were also obtained from commercial sources (13.8 percent), obtained from public sources (4.8 percent), born during projects (4.1 percent) and captured (1.7 percent).

Most fish were obtained from farms (37.1 percent), captured (35.9 percent) or sourced from breeding units (18.8.percent). Fish, used by 15 organisations, were also obtained from farms (23.4 percent), from commercial sources (11.3 percent), born during projects (9.9 percent), or obtained from commercial organisations (3.2 percent) and public sources (1.4 percent). Of the 2974 marine mammals (used by 4 organisations), 90.8 percent were classified as "captured"; 9.2 percent were obtained from public sources.

"Other birds", i.e. birds excluding chickens and pigeons, were used by 17 organisations and made up 62.2 percent of total birds used, with most being classified as captured (89.8 percent). The remainder were obtained from public sources (270), sourced from breeding units (268), farms (48) or commercial organisation (32). The majority of chickens, which made up 35.3 percent of total birds used and were used by 13 organisations, were obtained from farms (50.7 percent) or commercial sources (46.7 percent). The remainder coming from breeding units (1.6 percent), from public sources (0.7 percent) or were born during projects (0.3 percent). The 247 pigeons, used by 4 organisations, were all obtained from public sources.

The amphibia (used by 6 organisations), cephalopods/crustaceans (9 organisations), possums (7 organisations) and reptiles (9 organisations) were mostly captured or obtained from public sources. Dogs (19 organisations) were obtained from public sources (87.8 percent), from breeding units (4.6 percent), or from commercial sources (1.5 percent). Seventy-three were born during projects and six were imported into New Zealand. Cats (used by 16 organisations) came from public sources (88.3 percent) and breeding units (11.7 percent). Horses were used by a total of 17 organisations and supplied from farms (67.5 percent), from public sources (26.1 percent) and from commercial organisations (6.2 percent), with a further two coming from breeding units. Most "other species", used by 8 organisations, were captured (87.8 percent), with the remainder coming from public sources (9.4 percent) and from farms (2.8 percent).

6   Status of Animals

Code holders are required to categorise the status of the animals they use. The following table breaks down the animal status for the past two years.

Status of animals	2016	2015
	%	%
Normal/conventional	85.6	83.0
Protected species	3.7	3.5
Unborn/pre-hatched	3.4	3.1
SPF/germ-free	3.3	4.4
Transgenic/chimera	2.2	3.1
Diseased	1.8	0.1
Other	0.1	2.7

As in previous years, the majority (85.6 percent) of animals manipulated in RTT in New Zealand in 2016 were classified as normal, healthy, conventional animals.

More animals with protected species status were manipulated in 2016 (+ 1550). The rise was mostly due to an increase (+ 2453 to a total of 2699) in the number of marine mammals reported in this category. Other protected species reported as manipulated for RTT in 2016 included "other birds" (3850), fish (1558), reptiles (944), amphibia (205) and "other species" - bats (101).

The number of animals in the unborn/pre-hatched category increased by 1474 to 8533. Most of these were fish eggs (61.0 percent), unborn mice (19.8 percent) and chicken eggs (16.8 percent), with the remainder made up of prenatal sheep (1.3 percent) and reptile eggs (1.3 percent).

Fewer animals manipulated for RTT had a specific pathogen-free (SPF) or germ-free status than in 2015 (- 1554). These animals included mice (84.4 percent), rats (14.1 percent), pigs (1.3 percent) and rabbits (0.2 percent).

The number of animals classified as transgenic/chimera fell by 1448 or 20.8 percent from 2015. The majority of these were mice (83.5 percent) and fish (8.5 percent), amphibia (4.6 percent), goats (1.3 percent), rats (1.1 percent) and cattle (1.0 percent) making up the total. Five institutions used transgenic/chimera animals in 2016, compared to six in the previous year. Reflecting our relatively small biomedical research industry, New Zealand's usage of this category of animal is low by world standards.

Numbers of animals with a "diseased"[4] status rose by 4359 to 4653 in 2016. These included cattle (3244), sheep (1203), dogs (170), mice (17) and horses (15).

7 Outcome

Appendix 1 shows the five-year summary of the animals used (by species) and the percentages that died or were euthanased during, or after, manipulations. The number of animals that died or were euthanased during, or after, manipulations in 2016, fell by 25 799 to 62 401. After use, 75.5 percent of animals remained alive, compared to 60.9 percent in 2015. Of those alive, 71.1 percent were returned to owners, 10.4 percent were released to the wild, 9.8 percent were disposed of to others and 8.7 percent were retained by the institution. The majority of animals released to the wild were "other birds" (29.4 percent), fish (26.4 percent), cephalopod/crustacea (16.5 percent), marine mammals (14.9 percent) and reptiles (5.2 percent). "Other species" released were rats (497), amphibia (406), "other species" (252), possums (197), mice (161), 5 pigs and 2 pigeons.

The high survival rates (98.0 percent) for livestock reflect the number of trials of low invasiveness that take place while the animals remained in their normal farm environment and continued as part of the herd/flock at the conclusion of the trial. On the other hand, only 4.5 percent of rodents and rabbits remained alive following projects.

Animal use by species reported in 2016

---
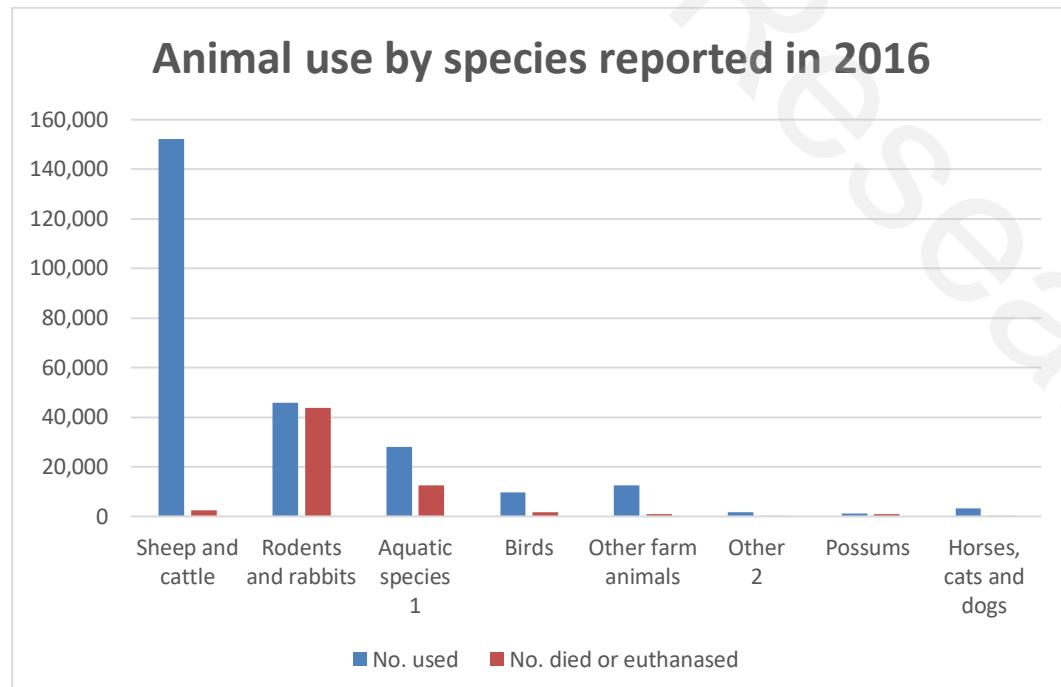
[4] Animals afflicted with naturally occurring disease, the focus of study usually being the cause, effects, cure or prevention of the disease.

(1)- 'Aquatic species' includes amphibia, fish, marine mammals and cephalopods/crustaceans
(2)- 'Other' includes reptiles and "other species" as defined in section 1

NB: Appendix 2 shows the 2015 report of the five-year summary of the animals used (by species) and the percentages that died or were euthanased during, or after, manipulations. It is important to note the amendment to the percentage of dogs that died or were euthanised in 2015 from 1% to 3%. This amendment is a result of a recalculation post publishing.

8 Organisation Type

Appendix 3 tabulates animal usage by organisation type over the past five years. The pie chart below shows the 2016 information graphically. The top three user groups in 2016 were (in order) commercial organisations, CRIs (Crown Research Institutes) and universities.

Animal usage by organisation type

- Commercial — 45.5%
- Universities — 20.0%
- Crown Research Institutes — 25.1%
- Other — 3.0%
- Polytechnics — 3.6%
- Government Departments — 1.6%
- Schools — 1.3%
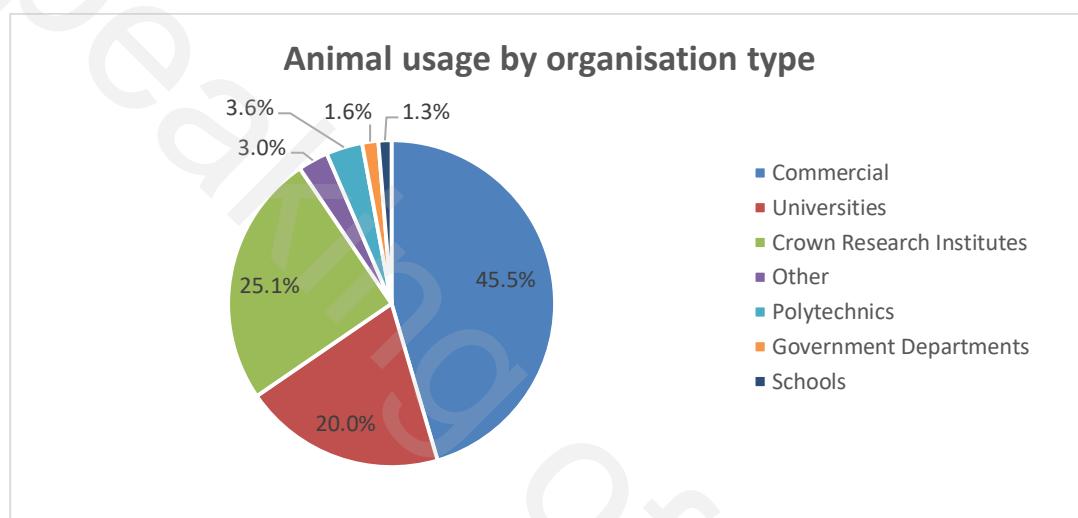
Commercial organisations used 115 654 animals in 2016 – 19 433 more than in 2015. Animals reported by commercial organisations were used for veterinary research (40.7 percent), production of biological agents (22.2 percent), testing (16.5 percent), teaching (11.6 percent), basic biological research (6.4 percent), and animal husbandry research (1.4 percent), "other" purposes (0.6 percent), environmental management (0.4 percent) and medical research (0.1 percent).

CRIs' animal use rose by 29 263 to 63 848 in 2016. Animals reported by CRIs were used for testing (53.1 percent), basic biological research (14.8 percent), animal husbandry research (13.0 percent), environmental management (9.8 percent), veterinary research (5.0 percent), medical research (3.5 percent), teaching (0.5 percent), species conservation (0.3 percent) and "other purposes" (<0.1 percent).

Universities reported 18 369 fewer animals than in 2015. Animals reported by universities were used for basic biological research (51.7 percent), medical research (19.4 percent), veterinary research (11.6 percent), teaching (6.8 percent), species conservation (5.6 percent), animal husbandry research (3.5 percent), environmental management (0.5 percent), other purposes (0.3 percent), testing (0.3 percent), production of biological agents (0.1 percent) and development of alternatives (0.1).

Organisations in the 'other' category include non-university medical research institutes, zoos/wildlife parks and individuals. The number of animals reported from this sector fell by 8684 in 2016. The majority of these (56.1 percent) were used for medical research – mainly rodents. Other animals were used for basic biological research (27.9 percent), teaching (15.0 percent), "other purposes" (0.5 percent, environmental management (0.4 percent) and veterinary research (0.1 percent).

Polytechnics and institutes of technology reported 4196 more animals in 2016 compared with 2015. The wide variety of animals manipulated by this sector were nearly all (95.5 percent) used for teaching, usually for low impact animal husbandry/veterinary nursing or similar training. Other animals were used for basic biological research (2.4 percent), animal husbandry research (1.9 percent) and medical research (0.2 percent).

Government departments reported the use of 3973 animals in 2016, up 1126 from 2015. The majority of these (55.0 percent) were used in veterinary research, mainly for investigation and surveillance of exotic avian diseases. Species conservation accounted for 34.8 percent and research into environmental management for 10.2 percent.

The use of animals in RTT reported by schools rose to 3342 in 2016, 2178 more than in the previous year. The wide range of animals, including cephalopods/crustaceans (3127), dogs (52), sheep (49), chickens (29), mice (22), cattle (20), horses (17), fish (11), cats (9), possums (5) and one rabbit, were all used for teaching purposes.

9 Animal Reuse

In 2016, 9.7 percent of animals were used more than once for RTT. Domestic animals (including livestock) made up 80.5 percent of the animals that were reused. With the exception of marine mammals, a proportion of every animal species was reported as being used more than once in 2016, although in many cases the numbers were very low.

10 Purpose of Manipulation

Organisations are required to provide information on the purpose of manipulations (in broad categories). The table below shows the breakdown and compares the 2016 figures with those reported in 2015. Descriptions of the "purpose of manipulation" categories are outlined in Appendix 4.

Purpose of manipulation	% of animals used	
	2016	2015
Veterinary research	22.9	19.2
Testing	20.9	6.8
Basic biological research	17.9	24.3
Teaching	11.9	16.9
Production of biological agents	10.1	<0.1
Medical research	6.5	9.7
Animal husbandry	4.7	15.4
Environmental management	2.9	4.9
Species conservation	1.8	2.0
Other	0.4	0.8
Development of alternatives	<0.1	<0.1

The main purpose for which animals were manipulated in 2016 was for veterinary research, with numbers rising 23.9 percent to 58 365. This was mainly due to increased numbers of farm animals being used in this category - sheep (+ 9563), cattle (+6072), goats (+ 330) and deer (+ 125). As in 2015, no pigs were used for veterinary research in 2016. More mice (+ 434) were used for veterinary research, as were cats (+ 300), horses (+ 245), dogs (+ 220), fowls/chickens (+197), guinea pigs (+ 46), possums (+ 22), rabbits (+20), reptiles (+ 8), pigeons (+ 7) and rats (+ 4). No fish were used for veterinary research compared to 5952 in 2015, and numbers of "other species" (- 201) and "other birds" (- 200) fell in this category. Veterinary research was undertaken by commercial organisations (80.6 percent), universities (10.1 percent), CRIs (5.5 percent), government departments (3.7 percent) and other organisations (<0.1 percent).

The number of animals manipulated for the purposes of testing rose 176.8 percent to 53 123 in 2016. The increase was due to a rise in the number of farm animals (+ 39 286) – cattle (+ 31 195), deer (+ 4263), sheep (+ 3699) and pigs (+ 129). The numbers of all the other species used for testing fell - rodents (- 5291), dogs (- 33), rabbits (- 23) and horses (-7). CRIs carried out 63.8 percent of the testing reported in 2016, with the remainder done by commercial organisations (35.9 percent and universities (0.3 percent).

The number of animals used for basic biological research fell by 17 751 in 2016. The fall was mainly due to less use of fish (- 15 434), reptiles (- 3298), possums (- 2261) and deer (- 19720 in this category. The numbers of "other birds", goats, pigs, amphibia, cephalopod/crustacea, "other species", dogs, horses, rabbits and guinea pigs also fell. The largest rises were in the number of marine mammals (+ 1806), chickens (+ 1655), sheep (+ 1417) and cattle (+ 1108) used for basic biological research, while numbers of pigeons, cats, mice and rats also rose. Universities (57.8 percent), CRIs (20.8 percent) and commercial organisations (16.3 percent) conducted the bulk of this research, with "other organisations" (4.7 percent) and polytechnics (0.5 percent) using the remainder in this category.

The number of animals reported as used in teaching rose 3.4 percent in 2016 to 30 396. The rise was mainly due to a 231 percent rise in the number of cephalopod/crustacea, and a 25 percent rise in the number of fish used. Cattle (15 119) were still the most common species used in this category. In 2016, all species except pigeons and marine mammals were used for teaching purposes. Commercial organisations reported most animal use in teaching in 2016, accounting for 44.2 percent of the total. Other organisations involved in teaching were polytechnics (28.8 percent), universities (11.3 percent), schools (11.0 percent), "other organisations" (3.8 percent) and CRIs (1.0 percent).

The number of animals reported as utilised in the production of biological agents rose from 2016 in 2015 to 25 717 in 2016. These were made up of 15 871 sheep, 6148 cattle, 2053 goats, 1040 mice, 500 horses and 105 guinea pigs. Commercial organisations carried out 99.8 percent of this work, with the remaining 0.2 percent carried out by universities.

The number of animals reported as being manipulated for medical research fell 37.1 percent to 16 542 in 2016. Rabbits and rodents made up 93.2 percent of the total. Other animals manipulated in this category included 513 fish, 367 sheep, 118 pigs, 98 dogs, 30 "other species" and four "other birds". Medical research was undertaken by universities (59.5 percent), "other organisations" (26.1 percent), CRIs (13.5 percent), commercial organisations (0.8 percent) and polytechnics (0.1 percent).

A total of 11 926 animals were reported as used for animal husbandry research in 2016, down 8342 from the previous year. Farm animals made up 91.8 percent of the total in this category. Other species reported in 2016 as manipulated for animal husbandry include fish (834), possums (38), amphibia (33), "other birds" (26), cephalopod/crustacea (17), rats (16), reptiles (10), mice (5), rabbits (3) and one guinea pig. CRIs (69.8 percent), universities (15.1 percent), commercial organisations (13.6 percent) and polytechnics (1.5 percent) reported manipulating animals for animal husbandry purposes in 2016.

Environmental management research used 7447 animals in 2016, 6748 fewer than in 2015. The decrease was largely due to a fall of 4984 to 3270 (43.9 percent of the total) in the number "other birds", and of 2252 to 1379 (18.5 percent of the total) in the number of fish. Other animals used in this category included possums (1056), cattle (657), rats (358), sheep (216), "other species" (207), pigs (126), amphibia (100), cephalopod/crustacea (55), mice (16) and dogs (7). CRIs universities (83.7 percent), commercial organisations (6.9 percent), government departments (5.5 percent) and "other institutions" (0.4 percent) carried out environmental management research.

Animal numbers reported for species conservation in 2016 rose 33.5 percent to 4453. These were made up of fish (1366), marine mammals (1106), rats (503), "other birds" (460), reptiles (435), amphibia (366), mice (197) and "other species" (20). The majority of this work was undertaken by universities (64.5 percent) with the remainder made up of government departments (31.0 percent) and CRIs (4.5 percent).

Animals reported as used for purposes other than those already specified rose by 693 to 949 in 2016. These included 788 farm animals, 160 rats and one horse. Research in the "other" category was undertaken by commercial organisations (77.0 percent), universities (17.0 percent), "other organisations" (4.2 percent) and CRIs (1.8 percent).

Sixty-four sheep were used by one university for the development of alternatives in 2016. See section 11 for details.

11 Grading of Animal Manipulations

Animal manipulations are graded according to a five point scale as specified in the Animal Welfare (Records and Statistics) Regulations. The name and description of the scale was changed in 2008 to better reflect the overall estimate of the impact or invasiveness of each animal use. The five grades are:

- "no impact or virtually no impact" - manipulations that causes no stress or pain or virtually no stress or pain
- "little impact" - manipulations of minor impact and short duration
- "moderate impact" - manipulations of minor impact and long duration or moderate impact and short duration
- "high impact" - manipulations of moderate impact and long duration or high impact and short duration
- "very high impact" - manipulations of high impact and long duration.

A more comprehensive description of the grading system has been published in the MPI publication *Animal Use Statistics* and is available on the website http://www.mpi.govt.nz/protection-and-response/animal-welfare/animals-in-research-testing-teaching/resources/

Appendix 5 summarises the impact grade allocated to animals manipulated for RTT and reported in 2016.

11.1 LONG-TERM TRENDS OF THE IMPACT OF RTT ON THE ANIMALS USED IN N NEW ZEALAND
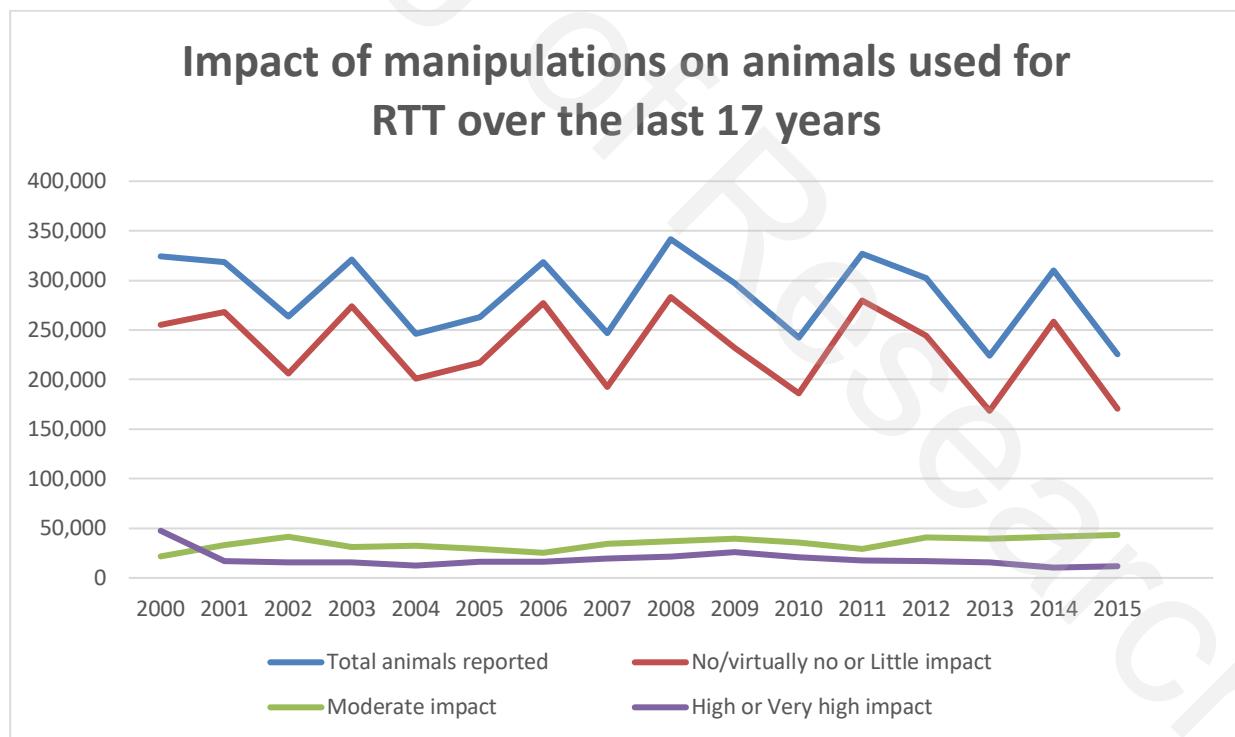
The percentage of animals that experience "no/virtually no" or "little impact" has averaged 81.0 percent since 2000 with a range from 75.2 percent to 87.0 percent. In 2016, 83.8 percent (213 176) of animals were exposed to manipulations in these categories.

The percentage of animals that experience "moderate impact" has averaged 12.5 percent over the last 17 years with a range from 6.7 percent to 19.3 percent. In 2016, 12.8 percent (32 681) of animals were classified in this category.

The percentage of animals that experience "high impact" or "very high impact" has averaged 6.4 percent over the last 17 years with a range from 3.4 percent to 14.7 percent. In 2016, a total of 8596 animals (3.4 percent of the total) experienced manipulations in these categories.

11.2 MANIPULATION GRADING OF ANIMALS REPORTED IN 2016

The increase in the number of animals manipulated for RTT in 2016 was reflected in the "little impact" category (up 37.9 percent, + 49 725) and the "high impact" category (up 11.9 percent, + 294). Compared to 2015 statistics, numbers fell by 35.3 percent (- 3172) in the "very high impact" category, by 24.7 percent (- 10 707) in the "moderate impact" category, and by 17.8 percent (- 6997) in "no impact" category.

Of the farm animals, 94.9 percent fell into the "no/virtually no" or "little impact" category, as did 96.6 percent of other domestic mammals (cats, dogs and horses), 94.6 percent of rabbits, 80.3 percent of miscellaneous species, 69.5 percent of birds, 55.8 percent of "other" species and 47.4 percent of rodents. The largest percentages of groups represented in the "moderate impact" category were "other species" (39.2 percent), rodents (37.2 percent) and birds (30.5 percent). Miscellaneous species (15.1 percent), farm animals (5.0 percent), rabbits (3.9 percent) and other domestic mammals (3.4 percent) were also recorded as experiencing moderate impact on their welfare. Details of animals recorded in the "high" or "very high impact" category are shown below.

11.2.1 Summary of impact of manipulations in animals used for RTT in 2016

2016 summary	Total reported	Number in each manipulation grade				
		No/virtually no impact	Little impact	Moderate impact	High impact	Very high impact
Rodents and rabbits	45 908	4 298	18 021	16 692	1 173	5 724
Sheep and cattle	152 276	10 869	133 440	7 802	115	50
Aquatic species[1]	28 014	12 099	11 644	3 969	272	30
Other domestic species	15 775	1 710	13 449	508	107	1
Birds	9 716	3 232	3 525	2 959	0	0
Possums	1 169	58	124	207	759	21
Other[2]	1 595	51	656	544	344	0
Grade totals	**254 453**	**32 317**	**180 859**	**32 681**	**2 770**	**5 826**
Grade percentages		**12.7%**	**71.1%**	**12.8%**	**1.1%**	**2.3%**

[1] 'Aquatic species' includes amphibians, fish, marine mammals and cephalopods/crustaceans.
[2] ''Other' includes reptiles and "other species" as defined in section 1.

Animals featuring in the "very high" impact group were cattle, one pig, cephalopod/crustacea, rodents and possums. Animals were classified in this and the "high" impact grades for the following reasons:

Cattle
- Assessment of head-only, reversible stunning for slaughter in accordance with Halal practices;
- Control animals used in a comparison of analgesia methods for disbudding with the aim of increasing the voluntary use of analgesia on farms where calves are disbudded without local anaesthetics.

Sheep
- Assessment of head-only, reversible stunning for slaughter in accordance with Halal practices;
- Control animals in a zinc prophylaxis trial;
- A proof of concept study for an ovine animal model for control of pelvic haemorrhage.
- A pilot study to look at the possible use of Botox on the hypertrophied bladder wall model to improve bladder function. A surgical technique for this was not well tolerated by the first sheep, so the study was discontinued;

- Two animals suffered leg fractures after surgery. Autopsy revealed these animals had underlying nutritional issues and were poor candidates for this type of surgery. The source of animals has been changed for future work.

Goats
- Assessment of head-only, reversible stunning for slaughter in accordance with Halal practices;
- Control animals in trials to evaluate alternative methods that cause less or no skull/brain injury than cautery disbudding and to evaluate post-operative acute and chronic pain, with aim of to improving the welfare of dairy goat kids.

Pigs
- A pilot study to establish a piglet model of reduced gastrointestinal tract integrity in human gut diseases. One piglet developed peritonitis as result of the procedure and was graded very high impact;
- A wild pig incurred some damage from a radio collar which could not be removed at the appropriate time because the pig had entered private land to which the researchers were denied access by the landowner.

Reptiles
- Capture, measurement, photography, tail tip sampling and subsequent release for a study which investigated the degree of gene flow between populations of lizards in urban habitats. The research was aimed at improving urban ecology and providing management guidelines for more sustainable urban development and protection of native species in urban areas.

Fish
- Grass carp were used as part of a project to develop a protocol to kill zooplankton species that can be translocated during transport of fish;
- Fish were exposed to low oxygen levels in research looking at growth performance of farmed fish;
- Fish were exposed to stress to assess the metabolic response to the fluctuating rock pool environment;
- A study involved the capturing of fish using a spear gun. Fish that did not die immediately were graded D;
- Aquatic toxicity testing;
- An investigation into the morphological changes associated with 'silvering' in NZ short-finned eels.

Cephalopod/crustacea
- Miscommunication regarding care over a holiday weekend resulted in the animals' death. The project was subsequently cancelled. The AEC put steps in place to avoid this occurring in future.

Guinea pigs
- Batch release testing for animal vaccines. This is a regulatory requirement to demonstrate potency;
- Veterinary research, and production and evaluation of biological reagents.

Mice
- Testing of antigens and animal vaccines mandated by regulation;
- Veterinary research, and production and evaluation of biological reagents;
- Unexpected deaths in a line of mice;
- Investigation into the safety and toxicity of a botulinum isolate;
- Identification of novel compounds that reduce methane production in New Zealand ruminant farm animals;
- Some mice became dehydrated in the course of a project. No clear reason could be established - various changes were made in their feeding and care, with little improvement, and the mice were euthanased;
- Mice were used to test the toxicity of food contaminants;
- Mice were used in the development of a small animal bioassay as a model for livestock disease.

Rabbits
- Two rabbits died from unknown causes (possibly related to anaesthesia) during a project.

Rats
- A pilot study to improve the survival rates of rats used in a stroke model;
- Exposure of neonatal rats to hypoxia for research into extreme prematurity;
- A project on serotonin effects on MDMA (Ecstasy) behaviour;
- Death due to adverse reactions to anaesthetic and surgical complications.

Pest Control
- Possums, rats, mice and ferrets were used in studies designed to improve effectiveness and humaneness of pest control methods;
- Possums were used in a field-based project aimed to identify the minimum effective size for cereal baits used in aerial 1080 baiting;
- A trial to assess the effects of a new strain of rabbit calicivirus disease on efficacy of current rabbit haemorrhagic disease circulating in the wild. The findings will inform the biological control of rabbits.

12 The Three Rs

Sixty-four sheep were recorded as being used in the development of alternatives in 2016. The experiment involving these sheep is part of a wider research programme aimed at understanding the nutritional needs of very young lambs via development of an *in silico* biological growth model. The object of this particular project was to test whether feeding growing lambs different protein to energy ratio requirements increased their growth rate and improved nutrient utilisation as modelling suggested. This research aims to reduce the number of sheep needed in the trial as the models will allow the assessment of many different feeding strategies without having to conduct an animal trial. Only the most appropriate one will go on to be validated in an animal trial. This approach will allow for the identification of knowledge gaps and facilitate specifically designed animal trials can provide information that will help to evolve the model as a whole.

The lamb research in question included the following steps:
1) The nutrient requirement for the modern sheep genotype, and lambs before weaning, have been revised/established;
2) Based on those requirements, a very simple model was developed to find out what the optimal diet composition for lambs before weaning should be;
3) An experiment was conducted to see if what the simple model predicted did actually happen;
4) Based on those observation, a further model was developed to daily protein and fat deposition;
5) The model was then evaluated against existing data set, and this was not perfect there are still a few gaps in our knowledge.

It is envisaged that this work will lead to further research to develop the optimal milk replacer and pellets which is of prime importance to the growing sheep and goat milking industries where lambs and goat kids will be raised artificially.

Appendix 1

ANIMAL USAGE REPORT: FIVE-YEAR SUMMARY OF THE NUMBER OF ANIMALS USED AND THE PERCENTAGE THAT DIED OR WERE EUTHANASED (BY SPECIES)

	2016		2015		2015		2013		2012	
	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased
Amphibia	593	3	1368	13	771	51	238	3	2021	64
Birds	9716	17	15627	13	31 588	42	25 685	13	14 638	15
Cats	926	<1	519	3	728	<1	676	3	695	<1
Cattle	104728	<1	59330	1	75 496	<1	52 193	2	124 582	<1
Cephalopods/ crustaceans	4815	28	2200	27	4756	28	5485	24	4288	27
Deer	7688	2	8497	<1	25 058	<1	2316	6	3927	8
Dogs	1304	7	812	3	1006	3	1437	8	915	2
Fish	19632	56	40764	49	40 555	30	24 354	53	28 044	32
Goats	4400	5	2052	9	3176	6	581	24	1568	<1
Guinea pigs	1900	96	1967	95	1864	95	2209	97	2090	96
Horses/ donkeys	924	1	283	0	237	2	272	2	758	<1
Marine mammals	2974	0	403	0	843	0	927	<1	783	0
Mice	34013	98	48341	99	58 379	97	45 018	98	55 870	99
Pigs	533	89	738	54	724	42	236	83	264	58
Possums	1169	75	2977	84	3983	94	2626	84	5570	54
Rabbits	1225	90	1494	90	1445	91	1386	92	1519	95
Rats	8770	87	9387	87	11 807	92	10 806	94	10 523	92
Reptiles	1235	8	4473	<1	325	<1	991	5	5349	<1
Sheep	47548	4	23474	11	44 745	8	46 218	3	38 544	7
Other species	360	18	604	7	2801	5	394	20	245	28
Total	**254453**		**225310**		**310 287**		**224 048**		**302 193**	
Yearly %		25%		39%		34%		36%		29%

Appendix 2

2015 AMENDED ANIMAL USAGE REPORT: FIVE-YEAR SUMMARY OF THE NUMBER OF ANIMALS USED AND THE PERCENTAGE THAT DIED OR WERE EUTHANASED (BY SPECIES)

	2015		2014		2013		2012		2011	
	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased	No. used	% died or euthanased
Amphibia	1368	13	771	51	238	3	2021	64	606	13
Birds	15627	13	31 588	42	25 685	13	14 638	15	40 937	35
Cats	519	3	728	<1	676	3	695	<1	978	10
Cattle	59330	1	75 496	<1	52 193	2	124 582	<1	106 601	<1
Cephalopods/ crustaceans	2200	27	4756	28	5485	24	4288	27	5118	86
Deer	8497	<1	25 058	<1	2316	6	3927	8	16 779	<1
Dogs	812	3	1006	3	1437	8	915	2	1048	12
Fish	40764	49	40 555	30	24 354	53	28 044	32	15 531	64
Goats	2052	9	3176	6	581	24	1568	<1	1983	<1
Guinea pigs	1967	95	1864	95	2209	97	2090	96	2394	97
Horses/ donkeys	283	0	237	2	272	2	758	<1	659	3
Marine mammals	403	0	843	0	927	<1	783	0	292	0
Mice	48341	99	58 379	97	45 018	98	55 870	99	74 133	98
Pigs	738	54	724	42	236	83	264	58	809	54
Possums	2977	84	3983	94	2626	84	5570	54	1629	84
Rabbits	1494	90	1445	91	1386	92	1519	95	1921	94
Rats	9387	87	11 807	92	10 806	94	10 523	92	10 674	93
Reptiles	4473	<1	325	<1	991	5	5349	<1	1664	1
Sheep	23474	11	44 745	8	46 218	3	38 544	7	42 571	6
Other species	604	7	2801	5	394	20	245	28	443	10
Total no. used	225310		310 287		224 048		302 193		326 770	
Yearly %		39%		34%		36%		29%		37%

Appendix 3

ANIMAL USAGE REPORT: FIVE-YEAR SUMMARY OF ANIMAL USAGE (BY ORGANISATION TYPE)

Group	Year	Rats, mice guinea pigs, rabbits	Sheep, cattle, goats	Other domestic animals	Birds	Fish	All other species	Total
Universities	2012	25,261	14,301	1,373	6,343	22,729	10,296	80,303
	2013	21 286	9297	2064	4393	10,301	5919	53,260
	2014	31,346	16,822	19,681	23,258	22,877	6461	120,445
	2015	22,737	9682	2003	5801	22,554	6393	69,170
	2016	**20,403**	**11,371**	**1554**	**2505**	**9862**	**5106**	**50,801**
Commercial organisations	2012	24,319	123,849	755	32	23	117	149,095
	2013	28,087	63,468	225	10,120	341	32	102,273
	2014	20,436	82,185	218	24	2984	12	105,859
	2015	22,195	60,708	714	7474	4811	319	96,221
	2016	**15,726**	**98,908**	**960**	**12**	**-**	**48**	**115,654**
Crown research institutes	2012	2,586	24,168	3,648	7,951	1,838	5,022	45,213
	2013	3818	25,446	2001	6183	10,972	2677	51,097
	2014	1866	22,975	7108	6103	11,174	1431	50,657
	2015	1818	13,828	7422	-	8537	2980	34,585
	2016	**4681**	**43,039**	**7788**	**4791**	**2284**	**1265**	**63,848**
Polytechnics	2012	152	1,715	549	116	3,187	168	5,658
	2013	174	729	614	73	2707	67	4364
	2014	206	1312	641	77	3418	146	5800
	2015	208	491	652	75	3455	75	4956
	2016	**207**	**2342**	**910**	**57**	**5602**	**34**	**9152**
Government departments	2012	167		122	133	-	19	195
	2013	-	-	43	4815	-	841	5656
	2014	2920	-	47	2081	2	3053	8103
	2015	-	-	17	2212	5	613	2,847
	2016	**501**	**-**	**7**	**2243**	**245**	**977**	**3973**
Other	2012	17,662	600	162	8	263	28	18,723
	2013	6025	52	24	62	16	3	6182
	2014	16,705	-	-	4	50	216	16,975
	2015	14,231	73	37	65	1398	563	16,367
	2016	**4367**	**947**	**78**	**79**	**1628**	**584**	**7683**
Schools	2012	22	61	29	55	4	2,606	2,777
	2013	29	-	9	39	17	1122	1216
	2014	16	123	58	41	50	2160	2448
	2015	-	74	4	-	4	1082	1164
	2016	**23**	**69**	**78**	**29**	**11**	**3132**	**3342**
TOTAL	2012	70,002	164,694	6,559	14,638	28,044	18,256	302,193
	2013	59 419	98 992	4937	25 685	24 354	10 661	224 048
	2014	73,495	123,417	27,753	31,588	40,555	13,479	310,287
	2015	61,189	84,856	10,849	15,627	40,764	12,025	225,310
	2016	**45,908**	**156,676**	**11,375**	**9,716**	**19,632**	**11,146**	**254,453**

Appendix 4

ANIMAL USAGE REPORT: 'PURPOSE OF MANIPULATION' CATEGORIES

Category	Description
Teaching	Animals used for teaching or instruction, at any level.
Species conservation	Work directed towards species conservation. The species to be conserved may or may not be directly involved, e.g. nutrition studies using more common species can benefit an endangered species.
Environmental management	Environmental management, including the control of animal pests and research into methods of reducing production of greenhouse gases.
Animal husbandry	Animal husbandry, including reproduction, nutrition, growth and production.
Basic biological research	Basic biological research.
Medical research	Research aimed at improving the health and welfare of humans, but not research on human subjects.
Veterinary research	Research aimed at improving the health and welfare of production and companion animals.
Testing	Animals used for public health testing or to ensure the safety, efficacy or quality of products to meet regulatory requirements for human or animal products, either in New Zealand or internationally.
Production of biological agents	Animals used for raising antibodies or for the supply of blood products.
Development of alternatives	Work aimed at developing methods to replace or reduce the use of live animals in research, testing and teaching.
Other	Manipulations for purposes other than those listed above.

Appendix 5

ANIMAL USAGE REPORT: SUMMARY OF THE IMPACT GRADE ALLOCATED BY SPECIES IN 2016

Species	No impact	Little impact	Moderate impact	High impact	Very High impact	Total
Amphibia	24	569	-	-	-	593
Birds	3232	3525	2959	-	-	9716
Cats	379	499	48	-	-	926
Cattle	7841	95 421	1396	20	50	104 728
Cephalopods/ crustacea	3825	889	71	-	30	4815
Deer	742	6930	16	-	-	7688
Dogs	420	878	6	-	-	1304
Fish	7999	8280	3081	272	-	19 632
Goats	82	3960	258	100	-	4400
Guinea pigs	44	454	17	832	553	1900
Horses	66	805	53	-	-	924
Marine mammals	251	1906	817	-	-	2974
Mice	3395	12 039	13 144	264	5171	34 013
Pigs	21	377	127	7	1	533
Possums	58	124	207	759	21	1169
Rabbits	118	1041	48	18	-	1225
Rats	741	4487	3483	59	-	8770
Reptiles	7	499	403	326	-	1235
Sheep	3028	38 019	6406	95	-	47 548
Other species	44	157	141	18	-	360
TOTAL	39 314	180 859	32 681	2770	5826	254 453
Percentage	15.5%	71.1%	12.8%	1.1%	2.3%	

Appendix 6

LIST OF CODE HOLDERS REQUIRED TO SUBMIT A STATISTICS RETURN FOR 2016

Aakland Chemicals (1997) Ltd
Abacus Biotech Ltd
Advanced Genetics 2015 Ltd

Advanced Regenerative Therapies Ltd
Ag Challenge Ltd
AgResearch Ltd
AgriHealth NZ Ltd
Agvet NZ Ltd
Airway Ltd
Alleva Animal Health Ltd
Alltech (NZ) Ltd
Aloe Vera NZ Ltd
Animal Breeding Services (2007) Ltd
Animal Health Research Ltd
Ara Institute of Canterbury
Argenta Manufacturing Ltd
Aroa Biosurgery Ltd
Arotec Diagnostics Ltd
AsureQuality Ltd
Auckland University of Technology
Auckland Zoological Park
Baker and Associates Ltd
Bayer New Zealand Ltd
Biocell Corporation Ltd
Boffa Miskell Ltd
Caledonian Holdings Ltd

Carne Technologies Ltd
Cawthron Institute
Cognosco, Anexa Animal Health

Connovation Ltd
Cropmark Seeds Ltd

CRV Ltd

CuroNZ Ltd
Dairy Production Systems Ltd
DairyNZ Ltd
Damar Industries Ltd
DCS Animal Health Studies Ltd
Department of Conservation
Dermvetonline
Duirs NZ Ltd
Eastern Institute of Technology
Elanco Animal Health
EquiBreed NZ Ltd
ES Plastics Ltd
Estendart Ltd
Eurofins AgroScience Services NZ Ltd
Eurofins SCEC Pty Ltd
FIL (New Zealand) Ltd
Haywood, Ursula
SBScibus Ltd

Herdwash Ltd
Hillcrest High School
Institute of Environmental Science and Research Ltd
InterAg
Intuit Regulatory and Marketing Ltd
Jurox Pty Ltd
Karori Sanctuary Trust
Knowles,Garry & Rohloff, Brent
Landcare Research New Zealand Ltd
Lawrence, David
LIC Deer Ltd
Life Technologies NZ Ltd
Lincoln University
Livestock Improvement Corporation Ltd
Living Cell Technologies NZ Ltd
Malaghan Institute of Medical Research
ManukaMed Limited Partnership
Mason Consulting
Massey University
Matamata Veterinary Services Ltd
McLeod, Graeme & Janelle
Medical Plus New Zealand
Merial NZ Ltd
MetriKlenz Ltd
MPI Investigation and Diagnostic Centre
National Institute of Water and Atmospheric Research Ltd
National Trade Academy
Nelson Marlborough Institute of Technology
New Zealand Association of Science Educators
New Zealand National Fieldays Society Inc
New Zealand Institute for Plant and Food Research Ltd
New Zealand Leather and Shoe Research Association (Inc)
Oamaru Veterinary Centre
On-Farm Research Ltd
Oritain Global Ltd
Otago Polytechnic
Ottman, Garry
Parnell Corporate Services Pty Ltd
PGG Wrightson Seeds
Pharmfirst Ltd
PharmVet Solutions
PJM Scientific Pty Ltd
Quantec Ltd
Rich Technology Solutions Ltd
Franklin Vets
GE Healthcare Tauranga Ltd
Goldenberg, Silvan
Grace, Neville

Schering-Plough Animal Health Ltd
SciLactis Ltd
Sirona Animal Health Ltd
South Pacific Sera Ltd
Southern Institute of Technology
Spring Sheep Dairy LP
Starboard Bio Ltd
Stemvet New Zealand Ltd
Synlait Milk Ltd
Synthase Biotech Ltd
Te Whare Wānanga o Awanuiārangi
Techion Group Ltd
The New Zealand King Salmon Company Ltd
The Vet Club
Toi Ohomai Institute of Technology
Totally Vets Ltd
Towers Consulting
Trinity Bioactives Ltd
Unitec Institute of Technology
Universal College of Learning
University of Auckland
University of Canterbury
University of Otago
University of Waikato
Vet Nurse Plus
Vet Resource Ltd
Vet Services Wairarapa Ltd
Veterinary Enterprises Group
Veterinary Health Research Pty Ltd
VetLearn
Vetlife Ltd
VetPlus Solutions Ltd
VetSouth Ltd
Victoria University of Wellington
Virbac New Zealand Ltd
Waikato Institute of Technology
Wanganui Veterinary Services Ltd
Wellington Institute of Technology
Wellington Zoo Trust
West Coast Vets Ltd
Zoetis New Zealand Ltd