

ACKNOWLEDGMENTS

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Speaking of Research

INTRODUCTION

As part of our accountability to the Canadian public and our commitment to transparency, the Canadian Council on Animal Care (CCAC) publishes an annual report on the number of animals included in Canadian science for the purposes of research, teaching, and testing.

CCAC certification is a condition for Canadian institutions to receive research funding from Canada's major national funding agencies (Canadian Institutes for Health Research and the Natural Sciences and Engineering Research Council) and other research funding bodies. Other CCAC-certified institutions may not receive this funding but choose to participate in the CCAC program for public accountability and to ensure they meet national standards of animal ethics and care.

CCAC-certified institutions are required to report annually on metrics related to animal research, teaching, and testing conducted at their institutions, and provide specific information regarding the types of animal-based science conducted, and the invasiveness of the procedures undertaken. Among other things, these data help the CCAC, CCAC-certified institutions, and their animal care committees make informed decisions on the allocation of additional care to animals in procedures where there is the potential for pain and distress.

For more detailed data, a comprehensive breakdown of the 2016 animal data is available on the CCAC website in sortable and downloadable [Excel files](#).

Data Limitations

In reviewing the information in this report, it is important to note the following:

- The CCAC only collects animal data from CCAC-certified institutions. As such, some animals studied in Canadian science will not be accounted for in the CCAC's annual animal data report. Furthermore, these numbers reflect all animals that were involved in research, teaching, and testing conducted by people working at CCAC-certified institutions, regardless of where the research activities take place. Therefore, these numbers include animals that live outside of Canada, and are also comprised of animals that live in laboratories, on farms, or in the wild.
- There are many external factors that may influence the numbers of animals from year to year, and therefore caution should be used when comparing numbers of animals over time or when tracking progress towards the Three Rs. Factors that may affect animal numbers include: changes in government funding priorities; regulatory changes; development and implementation of new technologies; changes in scientific interests; numbers and types of institutions certified by the CCAC; etc.
- Finally, the information gathered for this report relies on the process described in *Instructions for Completion of the CCAC Animal Use Data Form (AUDF)*. Although extensive validation of the data sets was carried out, it is difficult to determine accurately the extent of potential errors, which may have occurred at any stage in the process.

SUMMARY OF ANIMAL DATA FOR 2016

In 2016, there were 4,308,921 animals used in research, teaching, and testing reported to the CCAC (see Figure 1 and Table 1).

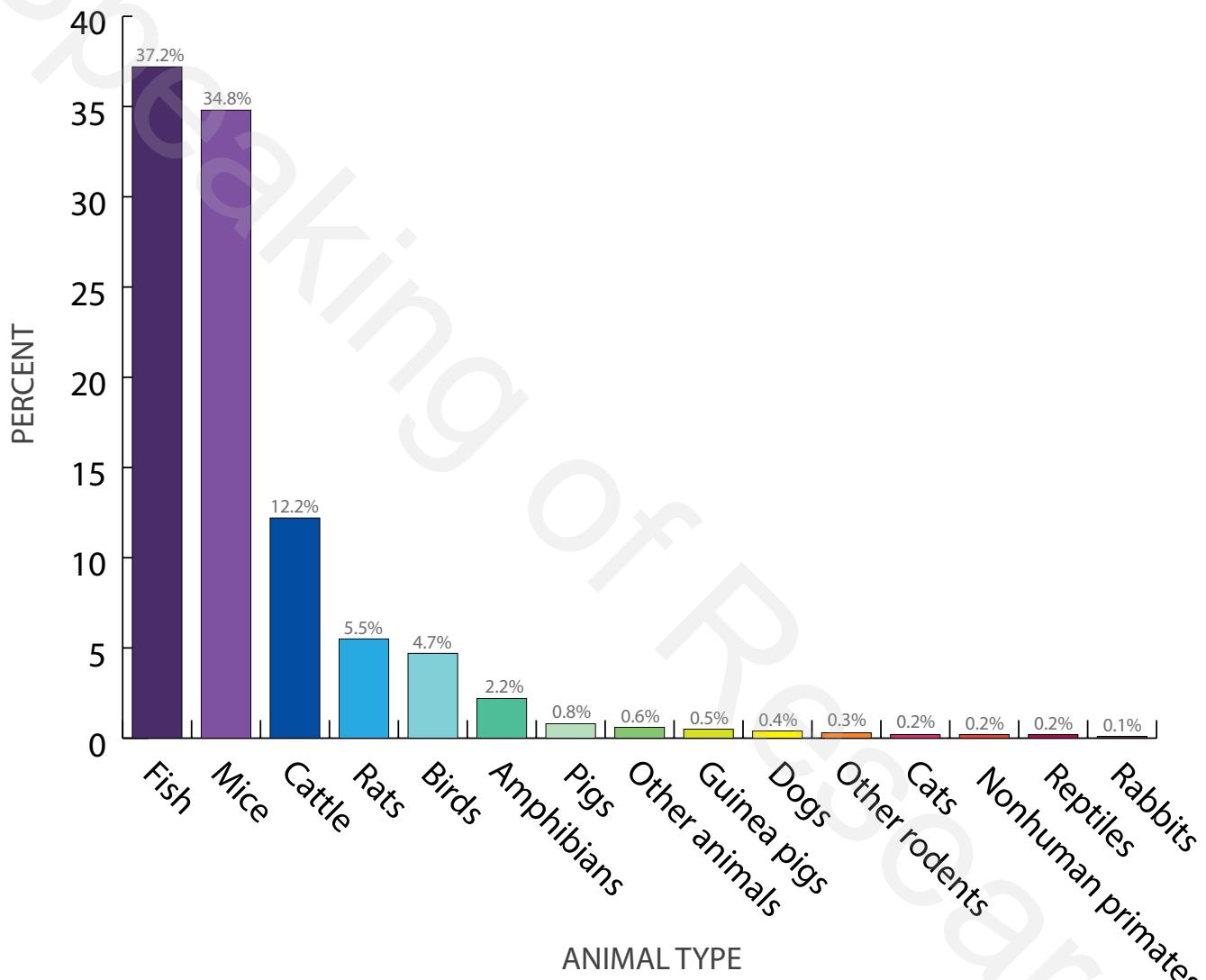
The three animal types most often used in 2016 were fish (37.2%), mice (34.8%), and cattle (12.2%) (see Figure 1).

The majority of animals (57.3%) were used in studies of a fundamental nature/basic research or Purpose of Animal Use (PAU) 1, representing 2,556,438 animals (see Table 2).

The benefit of assigning a Category of Invasiveness (CI) to protocols prospectively is that it allows animal care committees to signal to the scientific staff, veterinarians, and animal care staff the type of care a cohort of animals should receive. In the highest Category of Invasiveness, CI E, 97,455 (2.2%) animals were counted (see Table 3). The three types of animals most frequently used in CI E were fish, mice, and guinea pigs.

NUMBER AND TYPE OF ANIMALS IN SCIENCE

Figure 1: Percentage of Animals Used in Science at CCAC-Certified Institutions by Animal Type in 2016



Note: The percentages in this graph total 99.9% due to rounding.

Source: The data for this figure were derived from [Excel File 1](#). These represent the number of animals used for research, teaching, and testing in 2016.

Table 1: Number of Animals Used in Science at CCAC-Certified Institutions by Animal Type in 2016

ANIMAL TYPE	NUMBER OF ANIMALS
Fish	1,602,547
Mice	1,500,156
Cattle	526,249
Rats	236,952
Birds	204,374
Amphibians	95,820
Pigs	35,063
Other animals	27,142
Guinea pigs	22,423
Dogs	15,093
Other rodents	13,866
Cats	8,526
Nonhuman primates	7,556
Reptiles	7,257
Rabbits	5,897
Total	4,308,921

Source: The data for this table were derived from [Excel File 1](#). These represent the number of animals used for research, teaching, and testing in 2016.

PURPOSE OF ANIMAL USE

Purpose of Animal Use (PAU) refers to the reason why an animal was included in a scientific study. Each animal used in an animal-based protocol at a CCAC-certified institution is prospectively assigned to a single PAU. The CCAC collects and publishes data for PAU 1 through 5. For more information on PAUs, refer to the *Instructions for Completion of the CCAC Animal Use Data Form (AUDF)*.

The purposes of animal use are:

- PAU 1** Studies of a fundamental nature in science relating to essential structures or functions
- PAU 2** Studies for medical purposes, including veterinary medicine, that relate to human or animal diseases or disorders
- PAU 3** Studies for regulatory testing of products for the protection of humans, animals, or the environment
- PAU 4** Studies for the development of products or appliances for human or veterinary medicine
- PAU 5** Education and training of individuals in post-secondary institutions or facilities

Table 2: Number of Animals Used in Science at CCAC-Certified Institutions by Purpose of Animal Use (PAU) in 2016

PAU	NUMBER OF ANIMALS
1	2,556,438
2	572,557
3	273,764
4	627,768
5	431,742
Total	4,462,269

Source: The data for this table were derived from [Excel File 2](#). Animals can be used in more than one protocol provided that they have not been previously subjected to pain and distress. Some animals have been counted more than once in this dataset. These data cannot be compared accurately to animal data reports prior to 2012.

CATEGORY OF INVASIVENESS

Category of Invasiveness (CI) describes the level of pain and/or distress that an animal could potentially be exposed to while in a scientific study. In Canada, CIs are assigned prospectively to animal-based protocols for scientific purposes. A precautionary approach is taken by animal care committees in assigning the highest CI indicative of the potential level of pain and distress to be experienced by any of the animals within the protocol.

The benefit of assigning CIs prospectively is that it allows animal care committees to signal to the scientific staff, veterinarians, and animal care staff the type of care a cohort of animals should receive. Staff place more emphasis on animals used in protocols with higher CIs to ensure that these animals receive appropriate care to mitigate (as much as possible) any pain or distress they might experience. Examples of enhanced care could include analgesia, more bedding, increased warmth, or softer food.

In 2016, only 2.2% of animals were assigned to the most invasive category of protocols, CI E. Of these, more than half of the animals (63.9%) were used for testing purposes, which are required by the federal government to ensure that new drugs, vaccines, and products are safe and efficacious for use in humans and animals.

Since 1997, protocols involving the generation of genetically modified animals must be assigned to CI D as a precaution against any unforeseen, negative consequences of the modification. Animal care committees are asked to re-classify the protocol (generally to a lower CI), once the welfare status of the new animal lines has been confirmed; however, this precautionary period can be long term and will often exceed the reporting period. As a consequence, the rise in CI D protocols in recent years is most likely a direct reflection of the increasing number of genetically modified animals involved in scientific studies.

The categories of invasiveness are:

- CI A** Experiments on most invertebrates or on live isolates
- CI B** Experiments which cause little or no discomfort or stress
- CI C** Experiments which cause minor stress or pain of short duration
- CI D** Experiments which cause moderate to severe distress or discomfort
- CI E** Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

The CCAC collects and publishes data for CI B through E. For more information about CIs, refer to the [CCAC policy statement on: categories of invasiveness in animal experiments](#) and, for protocols using wildlife, the [CCAC guidelines on: the care and use of wildlife](#).

Table 3: Number of Animals in Science at CCAC-Certified Institutions by Category of Invasiveness (CI) in 2016

CI	NUMBER OF ANIMALS
B	1,719,208
C	1,376,031
D	1,269,575
E	97,455
Total	4,462,269

Source: The data for this table were derived from [Excel File 2](#). Animals can be used in more than one protocol provided that they have not been previously subjected to pain and distress. Some animals have been counted more than once in this dataset. These data cannot be compared accurately to animal data reports prior to 2012.

CHANGES TO THE CCAC ANIMAL DATA REPORT AND DATA MANAGEMENT

CCAC-certified institutions are required to report annually on metrics related to animal research, teaching, and testing conducted at their institutions, including the number of animals in the studies, the purpose of those studies, and the categories of invasiveness. Annual animal data reports have been published by the CCAC since 1975.

The process for data collection and publication has undergone several major reviews, most notably in 1996 and, more recently, in 2011, when the process and tools used to collect the data were refined. Notable changes to the process include: improvements to data management, collection and validation; revisions to the publication format; and publication of sortable, Excel spreadsheet files of the data. CCAC-certified institutions are now asked to submit animal data using an [Excel spreadsheet template](#) and to follow the revised *Instructions for Completion of the CCAC Animal Use Data Form (AUDF)*. Due to these differences in data management and reporting, however, it is not possible to make accurate comparisons with PAU and CI data prior to 2012.

GLOSSARY

Animals: All vertebrates and cephalopods used for research, teaching or testing, or for display purposes or eventual use in research, teaching or testing that are subjects of a written animal use protocol. Not all animals are included in the annual animal data reports (for example, breeding colony animals). Refer to the *Instructions for Completion of the CCAC Animal Use Data Form (AUDF)* for the full list of animals that are included.

Animal types: The labels used to describe broad categories of animals. It includes common animal names such as cats, dogs, guinea pigs, pigs, mice, and rats as well as broader labels such as amphibians, birds, fish, reptiles, other rodents, and other animals.

Animal use: The use of an animal in research, teaching or testing, or for display purposes or eventual use in research, teaching or testing, as described in a written animal protocol and approved by the institutional animal care committee.

CCAC-certified institution: A Canadian institution conducting animal-based science that earns a CCAC Certificate of GAP – Good Animal Practice®. The CCAC only collects animal data from institutions that participate in this program.

Category of invasiveness (CI): The level of pain and/or distress that an animal could potentially be exposed to while undergoing a scientific study. Each animal used in science at a CCAC-certified institution will be assigned prospectively to one CI (there are five levels). For more information about CIs, refer to the *CCAC policy statement on: categories of invasiveness in animal experiments* and, for protocols studying wildlife, the *CCAC guidelines on: the care and use of wildlife*.

Number of animals used: The number of animals used for research, teaching and testing during a calendar year (reported by species).

Other animals: An animal type category used to describe animal species that do not fit under any other animal type heading (for example, ferrets). Typically, these are species that are used in science less frequently.

Other rodents: An animal type category used to describe rodent animal species that are not mice, rats or guinea pigs (for example, hamsters).

Protocol: A written description of a scientific study using animals. At CCAC-certified institutions protocols must be reviewed and approved by the institutional animal care committee before animal use can occur.

Purpose of animal use (PAU): A category used to describe the reason why an animal was used in science. Each animal used in scientific studies at CCAC-certified institutions is assigned prospectively to a single PAU (there are six PAUs). For more information on PAUs, refer to the *Instructions for Completion of the CCAC Animal Use Data Form (AUDF)*.