



Live animal imports of exotic species/specimens into secure facilities for research purposes only (Part 2 of the Live Import List)

Preparing a draft assessment report and application to amend the *List of Specimens taken to be Suitable for Live Import* (Live Import List)

Research Terms of Reference

These terms of reference should be used by researchers wanting to import species that are not currently on the Live Import List for the purposes of research. The terms of reference outline the information that is required as part of an application to amend the Live Import List to include a new species for research purposes only. These Terms of Reference do not apply to applications relating to biocontrol agents. There are separate Terms of Reference for applications of this nature at; <http://www.environment.gov.au/biodiversity/wildlife-trade/permits/biological-control-agents>

1. Provide information on the taxonomy of the species.

Common name: Domesticated Ferret
Scientific name: *Mustela putorius furo*
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Carnivora
Family: Mustelidae
Genus: *Mustela*



The ferret (*Mustela putorius furo*) is the domesticated form of the European polecat, a mammal belonging to the same genus as the weasel, *Mustela*, in the family Mustelidae. Their fur is typically brown, black, white, or mixed.

2. Provide details on the way in which the species should be kept, transported and disposed of in accordance with the types of activity that the species will be used for if imported into Australia. You must include:
 - the containment (e.g. cage, enclosure) and management standards for this species to prevent escape or release. Include information on the security standards for this specimen including a discussion of why the proposed containment facilities are considered appropriate to mitigate the level of environmental risk posed by the species;

IATA approved transport crates suitable for animals of their size and nature are used for movement of ferrets. All air transport will be coordinated by approved transport agents and inline with requirement 22 of the International Air Transport Association (IATA) live animal regulations (IATA

2013) and under permit requirements issued by Department of the Environment, and Biosecurity Australia (Department of Agriculture) to Australia.

The Ferrets will be housed at the following CSIRO animal facilities.

1. The animal holding facilities at CSIRO's Werribee Animal Health Facility (WAHF) has Physical Containment (PC) Level 1 & 2 – PC1 & PC2 / Bio Containment (BC) Level 1 & 2 – BC1 & BC2 rooms all complying with the requirements of Department of Agriculture, Water and Environment (DA), Department of Health Office of the Gene Technology Regulator (OGTR) and the Australian Standard 2243.3.
2. The animal holding facilities at CSIRO's Australian Animal Health Laboratory (AAHL) in Geelong has PC2/BC2, PC3/BC3 and PC4/BC4 rooms all complying with the requirements of DA, OGTR and the Australian Standard 2243.3.

DA sets out requirements for how activities can be performed under an Approved Arrangement (AA) CSIRO's Animal facilities at Werribee and Geelong are AA sites used for research, analysis and/or testing of imported biological material including micro-organisms, animal and human products. These sites include microbiological facilities and animal facilities integral to the sites. They comply to class 5 requirements that should be read in conjunction with the appropriate Australian/New Zealand Standard. The Department of Agriculture set out four levels of containment established by the criteria. These are in ascending order of the stringency of containment requirements, which reflect the level of risk:

- Class 5.1 - Biosecurity Containment Level 1 (PC / BC 1)
- Class 5.2 - Biosecurity Containment Level 2 (PC / BC 2)
- Class 5.3 - Biosecurity Containment Level 3 (PC / BC 3)
- Class 5.4 - Biosecurity Containment Level 4 (PC / BC 4)

These facilities are inspected annually

OGTR provide guidelines for certification of a PC2, PC3 and PC4 Animal Facilities issued pursuant to section 90 of the Gene Technology Act 2000 (the Act). Once a facility is certified, the certification instrument imposes conditions on the facility pursuant to section 86 of the Act. All certified facilities must be inspected before certification and annually.

A facility certified as an Animal Facility is appropriate for the conduct of the dealings listed below:

1. the housing/keeping/rearing of GM animals (except arthropods and aquatic organisms - including amphibians); or
2. the housing/keeping/rearing of animals (except arthropods and aquatic organisms - including amphibians) that contain GMOs.

Full requirements for DA, OGTR and the Australian Standard 2243.3 animal facilities can be provided on request.

A brief excerpt from OGTR PC1 guidelines as a minimum are included below, please note the required facility conditions preventing animal escape:

A) Requirements for all facilities containing dealings with GMOs

*The facility to be certified must be a **fully enclosable space** bounded by walls, doors, windows, floors and ceilings.*

NOTE: The walls, doors, windows, floors and ceilings form the physical containment barrier around the area where dealings with GMOs will be conducted.

B) Requirements for facilities containing dealings with GM animals

Doors, and windows that are able to be opened, must be lockable. Windows that are able to be opened must be screened to prevent the entry or exit of arthropods.

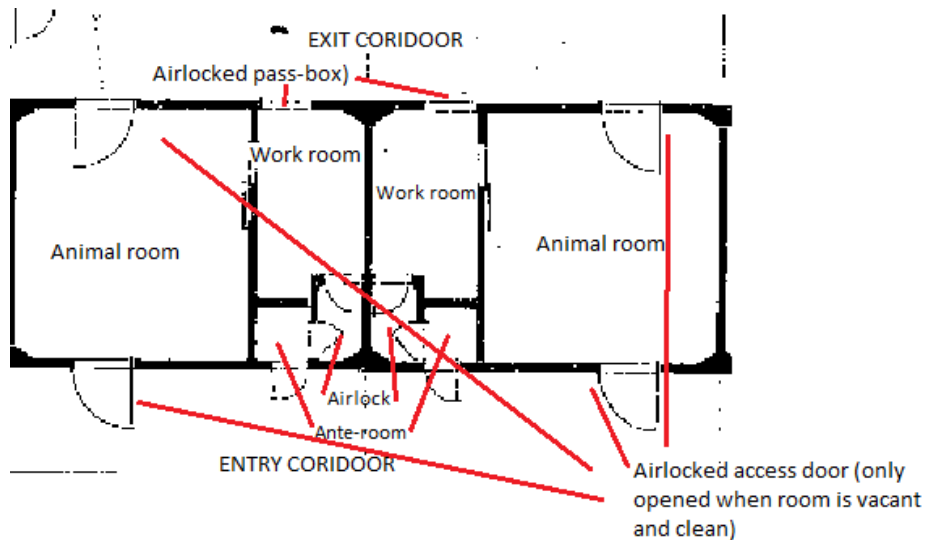
Except when persons are entering or exiting the facility, doors of the facility must be closed while GM animals are contained there. Windows and doors must be locked when facility personnel are not in attendance.

The facility boundaries (doors, walls, floors, ceilings etc.) must be designed to prevent the escape of the GM animals being contained.

Any openings in the facility walls, ceiling or roof, such as air vents, must be screened with rodent proof mesh.

*If the facility has drainage exits, they must be fitted with barriers (e.g. floor wastes or mesh) to prevent rodents or any other animals from entering the facility via the drains and to **prevent the escape of animals from the facility**. Where a dealing being conducted in the facility involves animals containing a GMO capable of being transmitted by arthropods, the drains must also be designed to prevent arthropods from entering or leaving the facility via the drains (e.g. by use of liquid traps permanently filled with water, or by a mesh that acts as a barrier to both arthropods and rodents).*

Ferrets housed at WAHF will be maintained within a PC2 Facility, in dedicated rooms where they are kept in free-range style walled pens. Upon arrival to AAHL's Large Animal Facility (LAF), ferrets will enter the Secure PC3 facility where they will be housed in either free-range style rooms, walled pens or cages that meet ethical requirements of the species. LAF dedicated animal rooms are comprised of an animal room which is separated from a work room by a sliding door, an airlock and an ante-room again separated from the main corridor by a door which requires pincode access by approved staff.



CSIRO plans to hold these animals at the 2 facilities outlined above. The WAHF and AAHL have highly regulated holding environments that enable CSIRO AAHL and external bodies to conduct safe and controlled animal experiments.

- procedures for the recovery or extermination of any escaped specimens; and

All animals will be housed in cages with fastenings that cannot be opened by the animals. Prevention of escape is mitigated by the facility structure including airlocked rooms, ante-rooms, drain coverings ensuring no unintentional release, contained sewerage collection and frequent monitoring of animal numbers.

- the disposal options for surplus specimens and at the conclusion of the research.

The number of animals imported would be directly informed by the numbers of ferrets required in research projects that are approved under an institutional Animal Ethics Committee (AEC) and institutional biosafety committee (IBC), or are nearing approval. Excess stocks would not be ordered. In the unlikely even that a study was cancelled thus leaving surplus animals these could be offered to approved institutions (other 'dead-end' institutions that have ethics approval for their work) for use in their studies or they would be humanely killed and cadavers disposed of following approved methods¹ dependent on the facility at which they are housed; AAHL Large Animal Facility (LAF) or Werribee Animal Health Facility (WAHF). Cadavers from within these certified facilities will be disposed of using approved methods relating to the containment requirements. These methods would include autoclaving and high heat incineration.

3. Provide information on, and the results of, any other environmental risk assessments undertaken on the species both in Australia and overseas, including any Import Risk

¹ <http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/tsd-guidelines-toc~tsd-guidelines-prt3>

Analyses undertaken by the Commonwealth Department of Agriculture, Water and the Environment.

Risk assessments have been completed by the Commonwealth Department of Agriculture. This has also informed state risk assessments for Tasmania (DPIPWE risk assessment) and Queensland. There have also been risk assessments conducted for New Zealand where ferrets are a banned species under the Biosecurity Act 1993 (NZ) and in South Africa under their own legislation. Ferrets are a controlled species in some areas of the United States of America, banned in Hawaii and controlled in California

- https://www.daf.qld.gov.au/_data/assets/pdf_file/0010/66943/IPA-Ferret-Risk-Assessment.pdf
- <https://dpiipwe.tas.gov.au/Documents/Ferret-risk-assessment.pdf>
- <https://www.agric.wa.gov.au/pest-mammals/ferret-animal-pest-alert?nopaging=1>

Current Federal legislation does not permit the importation of domestic ferrets. The Australian Capital Territory Native Conservation Act 1980 requires all keeping of ferrets to be under a licence, and the Victorian requirements depend on the local council rules with most areas requiring licences. Ferrets are listed as a “Class 1 pest animal in Queensland under the Land Protection (Pest and Stock Route managements) Act 2002 and are subject to eradication from the state. It is prohibited to import, keep, introduce or supply Class 1 pests in Queensland under the Act. Ferrets are listed as a Restricted Animal in the Northern Territory under the Territory parks and Wildlife Conservation Act. It is illegal to import or keep ferrets in the Territory under the Act. Ferrets can only be kept under license in Victoria and the ACT, however they may be kept as pets in Tasmania, Western Australia, New South Wales and South Australia”.²

Ferrets were originally imported into Australia in the 1880s and though occasional reports of wild ferrets are known, no permanent populations are known to have established in Australia. However, reports of ferrets living in the wild occur from time to time in southern Australia, mainly in Western Australia.³

4. Provide an analysis of the overall potential impacts on the Australian environment should the species escape containment, including a statement on the likelihood that the species could become an environmental pest.

The ferret is rated as being highly likely to establish wild populations in Australia and become a pest of agriculture, the environment and public enemy. A scientific risk assessment conducted by the Department of Agriculture and Food Western Australia and endorsed by the national Vertebrate Pests Committee indicates that the Ferret poses an extreme threat to Australia. If ferrets were to escape into the Australian environment they would be in competition with other pest species such as foxes, feral cats and dogs which could make it difficult to establish a successful colony.

- Has the potential to establish small populations in the wild that could go undetected for decades

² <https://dpiipwe.tas.gov.au/Documents/Ferret-risk-assessment.pdf>

³ <https://www.agric.wa.gov.au/sites/gateway/files/Animal%20Pest%20Alert%20-%20Ferret.pdf>

- Aggressive predator that could threaten biodiversity in Australia, with a wide range of Australian native birds, mammals and marsupials, reptiles and frogs
- Ground nesting birds could be under particular threat from direct predation on their eggs and chicks
- Impacts to commercial and backyard poultry production by taking chickens and eggs⁴

Regarding the introduction of rabbits into Australia, ferrets (*Mustela putorius furo*), have been used for many years to catch rabbits, but despite thousands of accidental releases they have not established feral populations even in those areas where rabbits are abundant, probably due to lack of alternative prey when rabbits stop breeding⁵.

"Ecology" is a journal that discusses the ability of introduced organisms to invade and become established, and the few exceptions to the "rule of ten." The rule of ten states that only one of ten importations lead to an introduction, only one of ten introductions lead to an establishment, and only one of ten establishments become a pest. So the chances of any given importation becoming a pest are about $1/10 \times 1/10 \times 1/10$, or about 1 in a thousand⁶.

It was, and is, common practice to breed ferrets to polecats to increase their hunting instincts, which must have occurred during the release program. Without human intervention, the two groups would not readily merge into one. Since both domesticated ferrets and European polecats were released into New Zealand, any survivors would have interbred, meaning their offspring (virtually all feral fitch on the island) would be domesticated-wild hybrids; technically not domesticated ferrets. Australia doesn't have any naturally occurring mustelids therefore this could not occur in a wild setting should any domesticated ferrets escape.

It is not AAHL's intention to breed any imported animals with natively bred colonies, nor provide an environment where accidental release is possible. As mentioned previously, the configuration of the two animal facilities in which they will be held, have highly regulated holding environments that enable CSIRO AAHL and external bodies to conduct safe and controlled animal experiments.

5. What conditions or restrictions, if any, could be applied to the import of the species to reduce any potential for negative environmental impacts (e.g. single sex imports, desexing animal prior to import etc.).

Listing this species under Part 2 of the Live Import List and applying the condition *Eligible non-commercial purpose only, excluding household pets* would reduce potential for negative environmental impacts.

Whilst single sex imports could be used as a way to prevent population expansion as a result of accidental release during transport, it would hamper the purpose of importing the ferrets for scientific

⁴ <https://www.agric.wa.gov.au/sites/gateway/files/Animal%20Pest%20Alert%20-%20Ferret.pdf>

⁵ Harry V. Thompson and Carolyn M. King (editors), *The European Rabbit: The History and Biology of a Successful Colonizer*, 1994 Oxford University Press, Oxford, New York and Tokyo.

⁶ Mark Williamson and Alastair Fitter 1996 The Varying Success of Invaders Ecology 77(6):1661-1666.

research. We would recommend that the usual restrictions related to shipping of single sex animals in the same crates were imposed, but not single sex shipments alone.

We would also recommend that restrictions were placed on those who were able to apply for an import permit to only institutions that have a demonstrated need for ferrets in a research context and with Approved Arrangements that are designated as appropriate by the Department of Agriculture and, where applicable, OGTR.

We would also recommend that restrictions be placed on those who were able to apply for an import permit to only institutions where they would be used in 'dead-end' projects i.e. animals are ultimately humanely killed, or were supplied to institutions where that would be the case.

Long distances that would be expected when importing ferrets, due to the limited number of research ferret breeding operations, is important to optimise transportation arrangements to ensure animal welfare standards are maximised to reduce stress. This requires reputable and appropriately trained transport companies who understand the regulations for ground and air transport and have developed mitigation strategies to prevent accidental release.

6. Provide a summary of the proposed purpose of import, including why this species has been chosen for import and details of the research facilities, including:

The proposed import is to support ongoing research at CSIROs AAHL high containment facility. The facilities in which these animals will be housed are vermin proof OGTR PC2, Department of Agriculture class 5.2 (WAHF) and high security area AAHL (LAF) facilities to prevent the escape of animals from the facility. Under The Department of Agriculture classifications the AAHL facility is classed as an Approved Arrangement (AA) facility biosecurity containment (BC) level 5.3. Class 5.3 AA sites utilised for goods subject to biosecurity control which pose significant risks to animals, plants or humans if pest or disease associated with them spread outside the AA site and from which significant economic impact would result in the community or environment.

- If the applicant is not the primary researcher, please provide the name of the person primarily responsible for this research and the name of the institution in which the research will be conducted

Name supplied- Animal Studies Team Leader, CSIRO Australian Animal Health Laboratory, Geelong, VIC, 3220 as delegate for the AAHL – Large Animal Facility (LAF)

- research affiliation/s e.g. University, CSIRO, Government Department etc;

CSIRO AAHL and WAHF.

- the type and certification level of the containment facilities where the species will be held.

Australian Animal Health Laboratory (AAHL) – PC3 containment facility, BC5.3.

Werribee Animal Health Facility (WAHF) – PC1 and PC2 containment facilities, BC5.2.

- security procedures, including a discussion of why the proposed security procedures (including disposal of waste/wastewater) are considered appropriate to mitigate the level of environmental risk posed by the species.

AAHL and WAHF follow strict DA and OGTR guidelines that are in place to prevent the escape of imported and GM organisms from PC facilities. These are more than sufficient to prevent the escape of non-GM stock animals.

All solid waste from the secure BC5.3/PC3 facility within AAHL is decontaminated prior to removal across the secure barrier, by methods such as autoclaving (standard barrier autoclave cycles are 121°C for 60 minutes), fumigation with formaldehyde gas, high heat incineration up to 900°C or submersion in Microchem disinfectant for 20 minutes. All animal solid animal waste or carcasses are incinerated, all wet waste is batch heat treated 125°C for 30 minutes which is validated by biological indicators.

- Why the species selected is the best species suitable for the research to be undertaken (if there another suitable species available from within Australia why is this species not being used?).

Ferrets are internationally recognised as the gold standard species for multiple disease models. Their size allows multiple animals to be included in studies increasing the accuracy of findings. Also their similarity to humans in aspects of their anatomy, physiology and metabolism see them being increasingly considered an alternative to larger animal models. Ferrets are extensively used in biomedical research including areas such as virology, reproductive physiology, anatomy, endocrinology and neuroscience. They have also been used across many broad areas of research, such as the study of pathogenesis and treatment in a variety of human disease, these including studies into cardiovascular disease, nutrition, respiratory diseases such as SARS, SARS CoV-2 and human influenza, airway physiology , cystic fibrosis and gastrointestinal disease. There are no native Australian mustelids that can be utilised for such research.

Research and diagnosis involving animal diseases of national interest is an integral part of the work carried out at AAHL. Some of these activities require the use of polyclonal antiserum as a reagent. Stocks of antisera against various diseases are maintained to ensure that surveillance programs can be conducted and so that we maintain a capability to test for a variety of serious diseases. Infection of ferrets with influenza virus accurately mimics infection in humans. Inoculating ferrets with influenza viruses of animal origin (such as birds and pigs) will produce an immune reaction that resembles that of humans. The antiserum produced in this way allows the evaluation of protection afforded by a putative vaccine to circulating viruses (vaccine matching), and thus provides essential information for pandemic preparedness.

Ferrets are the animal of choice for the production of antiserum to be used for analysis of influenza viruses as they are naturally susceptible to influenza virus infections and their response is similar to infection seen in humans.

Filoviruses (including the Ebolavirus and Marburgvirus) cause severe, haemorrhagic disease in people that often results in death. They are of concern both as a cause of natural human infection and as potential agents of bioterrorism. Ferrets are utilised as an animal model studying Ebolavirus as it is necessary to use live animals when the research goal is the development of vaccines, where an intact immune response is required.

Ferrets are bred in some states of Australia, but these are not specifically designed for use in an experimental setting, so their availability is not guaranteed. There have also been past problems of purchasing ferrets from Australian suppliers, only to find they are diseased. The option of importing

ferrets with high health status, from overseas specialist suppliers of laboratory animals, will provide AAHL with a robust alternative to home supply, for critical work.

- Will individual specimens be able to be identified and tracked through the import process? (e.g. microchipped tattooed animals).

Anticipated imports will be clearly communicated between sender and receiver to ensure the number, age and sex of animals due to arrive is known and this will be clearly recorded both on the transport cages and in the receiving facility upon receipt of the animals. It is possible that individual animals could be tattooed, microchipped or otherwise identified for import.

7. Provide information on the status of the species under the following international conventions:

- *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES). For example, is the species listed on CITES Appendix I, II or III?

CITES listing: No special status

- International Union for the Conservation of Nature (IUCN) Red List conservation status

IUCN Red list status: No special status

- *Convention on the Conservation of Migratory Species of Wild Animals* (CMS).

No listing.

8. Provide information about the ecology of the species. Include, but do not restrict your response to:

- lifespan of the species;

Ferrets have a natural lifespan of 7 to 10 years⁷.

- size and weight range;

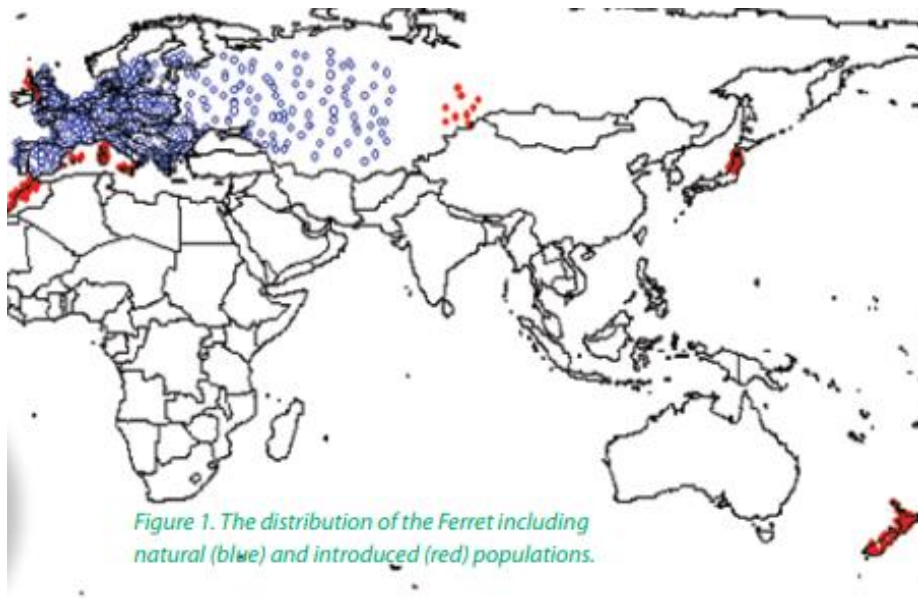
They have an average length of 51 cm (20 in), including a 13 cm (5.1 in) tail, weigh about 0.7–2 kg (1.5–4 pounds). Ferrets are sexually dimorphic, with males being substantially larger than females.

- the natural geographic range and how this range matches Australia's climate.(you can do this using 'Climatch' at the following address;
<http://data.daff.gov.au:8080/Climatch/climatch.jsp>)

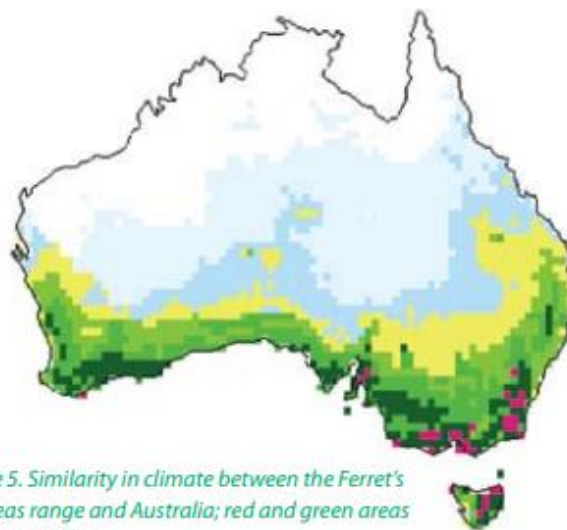
The natural range of the Ferret is Western Europe extending east to the Ural Mountains in west central Russia. Introduced populations occur as a result of the movement of wild ferrets by people, as well as from the escape or release of pet ferrets. Feral populations occur in Russia, Sardinia, Sicily, Morocco, the Canary Islands, the Isle of Man, and mainland Britain, as well as on the islands of Mull, Harris, Arran and Bute (off the coast of Scotland) and the Isle of Anglesey (off the coast of North Wales). Introduced populations have also occurred for a period of time in Japan and Jamaica. The ferret was also introduced to Australia and New Zealand in the late 1880s. It is now a widespread,

⁷ [Bradley Hills Animal Hospital, Bethesda, Maryland, USA, on lifespan of Ferrets](http://BradleyHillsAnimalHospital.com). Bradleyhills.com. Retrieved 2012-02-28.

established pest in New Zealand, but is yet to establish permanent populations in Australia. However, reports of ferrets living in the wild occur from time to time in southern Australia, mainly in Western Australia and Tasmania.



Source: <https://www.pestsmart.org.au/animal-pest-alert-ferret-3/>



Source: <https://www.pestsmart.org.au/animal-pest-alert-ferret-3/>

- habitat;

The Ferret lives in open forests, grasslands and bushland, as well as modified habitats including areas near human settlements, around rubbish disposal sites and on agricultural land. In addition, it can live in coastal areas (such as sea cliffs and sand dunes) and along river banks

- diet, including potential to feed on agricultural plants;

Ferrets are obligate carnivores⁸. The natural diet of their wild ancestors consisted of whole small prey, including meat, organs, bones, skin, feathers, and fur⁹. Ferrets have short digestive systems and quick metabolism, so they need to eat frequently. Prepared dry foods consisting almost entirely of meat (including high-grade cat food, although specialized ferret food is increasingly available and preferable)¹⁰ provide the most nutritional value and are the most convenient¹¹, though some ferret owners feed pre-killed or live prey (such as mice and rabbits) to their ferrets to more closely mimic their natural diet^{12,13}. Ferret digestive tracts lack a cecum and the animal is largely unable to digest plant matter¹⁴. Before much was known about ferret physiology, many breeders and pet stores recommended food like fruit in the ferret diet, but it is now known that such foods are inappropriate, and may in fact have negative ramifications on ferret health therefore the risk to agricultural plants is very minimal if at all potential.

- social behaviour and groupings;

Unlike their polecat ancestors, which are solitary animals, most ferrets will live happily in social groups. A group of ferrets is commonly referred to as a "business"¹⁵.

- territorial and aggressive behaviours;

They can become very friendly if handled frequently when young, although nursing jills can be aggressive and protective of their young. They are territorial, like to burrow, and prefer to sleep in an enclosed area¹⁶.

- natural predators; and

Domestic ferrets don't have any natural predators since they are domesticated. Predators such as hawks, owls, or larger carnivorous mammals would hunt them given the opportunity.

- characteristics that may cause harm to humans and other species.

Domestic ferrets, if not properly vaccinated or cared for, can harbor certain diseases that are transmissible to humans. Domestic ferrets have formed feral populations in some parts of the world and can be a serious pest of native birds and other wildlife. Colonies of feral ferrets have established themselves in areas where there is no competition from similarly sized predators, such as in the Shetland Islands and in remote regions in New Zealand. Where ferrets coexist with polecats,

⁸ Williams, Bruce H. (January 1999) [Controversy and Confusion in Interpretation of Ferret Clinical Pathology](#), Armed Forces Institute of Pathology: "... the ferret, being by nature an obligate carnivore, has an extremely short digestive tract, and requires meals as often as every four to six hours."

⁹ [Rethinking The Ferret Diet – Info about species-appropriate diets, and the negative effects of commercially prepared diets, written by a veterinarian](#). Veterinarypartner.com. Retrieved 2012-02-28.

¹⁰ McLeod, Lianne. [Feeding Your Ferret](#). exoticpets.about.com

¹¹ ["Feeding Your Ferret," The Pet Wiki, Retrieved February 26, 2014](#). Thepetwiki.com. Retrieved 2012-02-28.

¹² ["Feeding Ferrets whole rabbits ?"](#). *The Hunting Life*. Retrieved 6 October 2012.

¹³ ["Raw Diets". For Ferrets Only. Archived from the original on 12 October 2013. Retrieved 6 October 2012.](#)

¹⁴ ["Gastrointestinal Disease in the Ferret"](#). Retrieved 24 April 2014.

¹⁵ Robertson, John G. (1991). [Robertson's Words for a Modern Age: A Cross Reference of Latin and Greek Combining Elements](#). Senior Scribe Publications. p. 232. ISBN 978-0-9630919-1-8.

¹⁶ Brown, Susan, A. ["Inherited behavior traits of the domesticated ferret"](#). weaselwords.com. Retrieved 29 January 2010.

hybridization is common. It has been claimed that New Zealand has the world's largest feral population of ferret-polecat hybrids.¹⁷

9. Provide information on the reproductive biology of the species, including

- the age at maturity (first breeding);

They become sexually mature at approximately eight months and the average life span is seven to 10 years¹⁸¹⁹. Ferrets are induced ovulators²⁰.

- how frequently breeding occurs;

Healthy domestic ferrets can have up to three successful litters per year, and up to 15 kits.

Ferrets reach puberty in the spring following birth at approximately eight to 12 months of age. They are seasonal breeders: in the northern hemisphere, females are active between March and September, and males from December to July. This is determined by photoperiod. Females are seasonally polyoestrous between March and September; however they are induced ovulators and will remain in heat for three to six months if not mated. The high level of oestrogen present during oestrus can be detrimental, leading to bone marrow depression and anaemia²¹.

A female in estrous is identifiable by a swollen pink vulva due to an increase in estrogen. Females can go into lactational estrous on some occasions. Lactational estrus occurs if the litter size is less than 5 kits. Lactational estrus is when the female will go back into estrous while lactating the litter that she just had.

- if the female can store sperm;

Female ferrets cannot store sperm.

- how many eggs or live-born young are produced at each breeding event;

The average gestation period is 42 days and females may have two or three litters each year. The litter size is usually between three and seven kits which are weaned after three to six weeks and become independent at three months.

Gestation length is about 42 days. Young domestic ferrets are altricial at birth, and need about 8 weeks of parental care. Kits are born deaf and have their eyes closed. Newborns typically weigh about 6 to 12 grams. Baby incisors appear about 10 days after birth. The kits eyes and ears open when they are 5 weeks old. Weaning of the kits is done while they are 3-6 weeks old. At 8 weeks, kits have 4

¹⁷ "[Feral Ferrets in New Zealand](#)". *California's Plants and Animals*. California Department of Fish and Game. Archived from [the original](#) on 2006-09-05. Retrieved 2006-09-12.

¹⁸ "[All about ferrets](#)". New Jersey Veterinary Medical Association. Retrieved January 15, 2015.

¹⁹ "[Domestic ferret](#)". Elmwood Park Zoo. Retrieved January 15, 2015.

²⁰ Carroll, R. S., et al. "[Coital stimuli controlling luteinizing hormone secretion and ovulation in the female ferret](#)." *Biology of reproduction* 32.4 (1985): 925-933.

²¹ <https://www.nc3rs.org.uk/3rs-resources/housing-and-husbandry/ferrets>

permanent canine teeth and are capable of eating hard food. This is often the time that breeders let the kits go to new owners. Female kits will then reach sexual maturity at 6 months old.^{22,23}

- if the species has hybridised with other species (both in the wild and in captivity) or has the potential to hybridise with any other species; and

Where ferrets coexist with polecats, hybridization is common. It has been claimed that New Zealand has the world's largest feral population of ferret-polecat hybrids.²⁴ However, there are no native mustelids in Australia that could cause a potential hybridisation of species.

- if the species can hybridise, are the progeny fertile?

Yes. Where ferrets coexist with polecats, hybridization is common and they are known to be able to reproduce fertile offspring. It has been claimed that New Zealand has the world's largest feral population of fertile ferret-polecat hybrids. Being so closely related to polecats, ferrets easily hybridize with them, and this has occasionally resulted in feral colonies of polecat-ferret hybrids that have caused damage to native fauna, especially in New Zealand²⁵. As a result, New Zealand and some other parts of the world have imposed restrictions on the keeping of ferrets.

In 1877, farmers in New Zealand demanded that ferrets be introduced into the country to control the rabbit population, which was also introduced by humans. Five ferrets were imported in 1879, and in 1882–1883, 32 shipments of ferrets were made from London, totalling 1,217 animals. Only 678 landed, and 198 were sent from Melbourne, Australia. On the voyage, the ferrets were mated with the European polecat, creating a number of hybrids that were capable of surviving in the wild. In 1884 and 1886, close to 4,000 ferrets and ferret hybrids, 3,099 weasels and 137 stoats were turned loose²⁶.

- is the species capable of Parthenogenesis or sequential hermaphroditism?

Parameters critical to the success of parthenogenetic activation of ferret oocytes are yet to be determined²⁷.

There is only 1 report of true hermaphroditism, in a 9-month-old male ferret that was presented with bilateral nonpruritic alopecia²⁸. A bilateral cryptorchidism with fully developed uterus and ovaries was seen by laparoscopy and confirmed by histopathologic examination of all the tissues.

²² Kaytee, 2001. "Ferret Health" (On-line). Accessed 24 October 2001 at <http://www.kaytee.com/smallanimals/ferrets/index.html>.

²³ Kaytee, 2001. "Ferret Vital Statistics" (On-line). Accessed 24 October 2001 at <http://www.kaytee.com/smallanimals/ferrets/vital.html>.

²⁴ "Feral Ferrets in New Zealand". *California's Plants and Animals*. California Department of Fish and Game. Archived from [the original](#) on 2006-09-05. Retrieved 2006-09-12.

²⁵ "Ferrets: New Zealand animal pests". *Department of Conservation*. New Zealand Department of Conservation (DOC). 11 August 2006. Archived from [the original](#) on 2014-07-24. Retrieved 25 July 2014.

²⁶ "Rabbit control". *A Hundred Years of Rabbit Impacts, and Future Control Options*. New Zealand Ministry of Agriculture and Forestry (MAF) Rabbit Biocontrol Advisory Group. Archived from [the original](#) on June 17, 2001. Retrieved 2006-09-12.

²⁷ <https://academic.oup.com/biolreprod/article/66/5/1380/2723911>

²⁸ Bertheled A. A case of true hermaphroditism in a ferret. *Proceedings of the International Conference on Avian and Herpetological and Exotic Mammal Medicine, ICARE 2015*. Paris, April 18–23, 2015. p. 447.

10. Provide information on all other Commonwealth, state and territory legislative controls on the species and proposed research, including any state/ territory risk assessments of the species available.

In recognition of the risk posed by the Ferret, various jurisdictions have laws regarding their keeping. It is illegal to keep or import Ferrets into the Northern Territory and Queensland, and a permit is required to keep Ferrets in the Australian Capital Territory. Ferrets are permitted in the other states, although in Tasmania it is an offence to release Ferrets into the wild. To help prevent Ferrets from establishing in the wild and becoming pests in Australia, it is essential that captive animals are maintained in secure enclosures. Unwanted Ferrets should be surrendered to a responsible organisation, not released. Any Ferrets seen in the wild should be reported to the nearest relevant government department or wildlife authority so that appropriate action can be taken.