

DRAFT report terms of reference: Live animal imports of exotic species/specimens

Heliculture, more commonly known as snail farming, is the practice of breeding snails for commercial use. Snail farming provides snail meat (escargot) and snail eggs (caviar) for human consumption.

It is our intent to import *Cornu Aspersum* breeding snails to commence a commercial snail farm in the South West of Western Australia. The *Cornu Aspersum* (common brown garden snail) is prevalent across Australia as an introduced species.



TAXONOMY

Cornu Aspersum (Muller, 1774)

Family name: Helicidae

Genus name: *Cornu*

Species: *Cornu aspersum* (Muller, 1774)

Taxonomic Reference: Australian Biological Resources Study – Australian Faunal Directory. https://biodiversity.org.au/afd/taxa/Cornu_aspersum

Common Names: Brown garden snail.

Synonyms: *Helix Aspersa* Muller, 1774; *Cantarues aspersea* (Muller, 1774),

This species is not genetically modified and is not listed as protected under CITES.

DNA sequences of *C. aspersum* found in Australia have been added to the Barcode of Life Database (BOLD).

<https://australianmuseum.net.au/journal/blacket-2016-rec-aust-mus-683-99116>

ECOLOGY

Cornu Aspersum (*C. aspersum*) is a herbivore and feeds on a variety of vegetation. It is also considered an omnivorous scavenger as it feeds on rotting plant matter and will scavenge animal matter such as crushed snails and dead worms.

The exact lifespan is undocumented however observations in natural environmental conditions suggest a life span of 3-5 years, and in artificial environments may be 10 years.

The adult shell ranges from 25-40mm in diameter and 25-35mm high. The shell is hard with four or five 'whorls' of varying colour and shade. Most commonly described as dark brown/yellow with flecks or streaks. Many factors affect shell growth including availability and type of food, genetics and environmental conditions.

The snail is a hermaphrodite and therefore no distinctions can be made for male/female. Adult weight averages 8 to 12 grams with preferred weight for commercial sale of 10 grams.

The snail is composed of a head, a foot and visceral mass.

The head contains two pairs of tentacles. The larger two are used for sight and the smaller two are used for touch. Below the tentacles is the mouth and the genital orifice is located on the right hand side behind the head.

The foot allows the snail to move and supports the weight of the shell. The filtrate ('slime') protects the body and assists the foot to move.

The visceral mass contains all the organs for respiration, reproduction, digestion and circulation.

Native to Europe, the Middle East and North Africa. Introduced to Australia over 120 years ago and today is found in all states though more predominant in South West and Eastern regions. It is a non-migratory species. Population is limited by optimum climatic conditions. Ideal conditions to remain active are 7 to 28 degrees Celsius, and humidity of 75-90%.

During very dry or cold weather the snail will seal the opening to the shell with a membrane of dried mucous called an epiphragm. This allows the snail to hibernate in winter and aestivate in warmer conditions. The epiphragm helps the snail retain water and provides a barrier to some predators such as ants. They can remain dormant for several months until conditions return to optimal.

The snail has no particular nesting area though is commonly found in places it can shelter from predators and environmental conditions such as strong wind, heavy rain etc. It is found under rocks, vegetation, trees and other stationary objects during the day. Snails prefer rich soils, agricultural areas, urban gardens, and areas high in vegetative food sources. They are more active at night and early morning when they travel to food sources. Snails cannot swim so will drown if unable to climb out of a wet area, so they are not commonly found in waterways.

Snails may be found individually though prefer to remain in group populated areas. After they immerge from seasonal hibernation their focus is to source food and breed so will remain in an area populated with other snails for breeding purposes.

There is little documented evidence to suggest that *C. aspersum* is territorial or aggressive. The snail moves at a maximum speed of 1.3 centimetres per second, or approximately 47 metres per hour. Given this rate they do not travel far from their location if food source is sufficient. They have a strong homing instinct and have been found to return to a regular hibernation site.

Physically they are unable to cause harm to animals of a larger size or humans. The mouth contains one small tooth that is shaped in a circular arc and the radula (tongue) is covered with many small horn shaped teeth. They use a 'rasping motion' with the radula to scrape their food in a forward/backward motion. They are used within the cosmetic industry in 'spa treatments' which involves placing live snails on a person's face for the benefits of their filtrate ('slime'). A safe practice globally practiced resulting in no harm.

REPRODUCTIVE BIOLOGY

In natural environmental conditions snails reach reproductive maturity in approximately two years. In controlled conditions such as can be provided with farming methods, they may reach maturity in 10-12 months.

Snails are hermaphrodites and have the male and the female genitals located in the one opening.

Adult mature snails can mate 2-6 times per season. A season will vary with consideration to location and climate which differs with amount of sunlight,

humidity and heat. Considering these factors the average growth time to maximum size is around 6-10 months.

Mating occurs in a pair and both of the snails will act simultaneously as male and female. Fertile eggs are produced by cross fertilisation during mating. Therefore during mating both snails will receive sperm, eggs will be fertilised and subsequently both can lay eggs. A spermatophore encases the sperm for protection during transfer. *C. aspersum* is capable of long term sperm storage.

During optimal environmental conditions generally the snail will lay the eggs within two weeks. They can mate again any time after that.

To lay the eggs the snail will dig a hole with its foot to a depth of 4-7cm. It then lays the eggs in the hole and leaves them. Ideal soil is friable and moist however not saturated or the eggs will not survive.

The eggs are laid in batches. Numbers may vary significantly (depending on age and other factors) and the average is around 40-100 per batch. The baby snails will hatch from 14 to 40 days depending on the soil temperature. The warmer the soil the faster they will hatch. They do not hatch all on the same day and may be several days apart. Egg cannibalism by the hatchlings is common and the baby snails may eat the other eggs if they remain in the soil for too long.

There are no research papers found to date to confirm that *C. aspersum* is able to hybridize with another species.

SPECIES POPULATION

C. aspersum is considered an invasive species that is found on all continents except Antarctica. It is thought to be native to Europe, North Africa and the Middle East. It thrives in regions with Mediterranean, temperate and subtropical climates. It has been introduced across the globe intentionally for commercial farming purposes (for edible and cosmetic uses) and unintentionally through transportation mostly on vegetative matter (garden plants, vegetables, fruit etc.).

It is considered a pest in agriculture. Active pest management such as chemical sprays are used by growers in the agriculture industry. Snails feed on plant matter and can destroy crops if not managed appropriately. They are also considered a pest in residential areas as they are found in gardens and will eat plants around the home. Garden 'snail pellets' is a simple common method to kill the snails around the home.

C. aspersum has been distributed globally by human activities. There is no species known to be an efficient vector for passive dispersal.

C. aspersum is currently found in all states of Australia.

ENVIRONMENTAL RISK

C. aspersum must be controlled in agricultural settings or will have a negative financial impact for commercial growers. There are a variety of chemical products available on the market to kill unwanted snails that are used to date. *C. aspersum* is able to survive on a variety of plant matter so is not constricted to certain agricultural types. They will eat cereal, fruit, vegetable crops etc.

LIKELIHOOD OF IMPORTED POPULATION BEING ESTABLISHED IN AUSTRALIA

C. aspersum is already prevalent in Australia. The climate particularly in the South West and Eastern states is very conducive to the life cycle of the snail. It is commonly known as the brown garden snail.

POTENTIAL IMPACT IF IMPORTED SPECIES IS ESTABLISHED IN AUSTRALIA

C. aspersum has been a well-established mollusc in Australia for over 120 years.

The species may contract *Angiostrongylus cantonesis* (AC) commonly called rat lung worm. It is a parasitic worm that may cause a type of meningitis. Infected rodents carry the adult worm and pass it in their faeces.

All Molluscs (snails, slugs) are at risk of carrying AC. They ingest the immature worms from the rat faeces and become infected. Humans may become infected by eating raw or undercooked snail meat. In most cases the meningitis symptoms will resolve and patients recover completely, however there have been documented cases of paralysis, blindness and death. Transmission is avoided by ensuring any snail meat eaten is cooked as per food safety standards.

C. aspersum may also be contaminated with salmonella from contact with animal faeces. If the snail is cooked as per food safety standards the salmonella bacteria is destroyed and safe for human consumption.

Natural Enemies

There is no natural enemy known to be specific to *C. aspersum*. They are a food source for many animals, including rodents, birds, amphibians, reptiles, myriapods, insects, planarians, spiders and predatory terrestrial snails (*Rumina decollate*, and *Euglandina rosea*). Native to the Mediterranean, the land snail *Rumina decollate* has been introduced in some countries as a biological pest control agent for *C. aspersum*. The concern is, *Rumina decollate* is non-discriminatory and feeds on a variety of common garden snails and slugs and their eggs. This species is not found in Australia. In addition *Euglandina rosea* (commonly known as rosy wolfsnail/cannibal snail) native to central America

is also a carnivorous gastropod with similar characteristics to *Rumina decollate*. This species is also not found in Australia.

C. aspersum is susceptible to endoparasitic nematodes. These may cause mortality and affect their reproductive ability. The eggs may also be affected by other microbes mostly commonly fungi. These will destroy the eggs. There is little research and evidence discussing the ability of *C. aspersum* to transmit disease to other species.

Impacts on habitat and local environments.

In areas that vegetation is sparse *C. aspersum* will feed on all available matter. They will eat surface vegetation. They cause damage to plants, seedlings, underground tubers, leaves and fruit. In particular damage to seedlings may cause the plant to die.

Limited information is found discussing the impact of *C. aspersum* on biodiversity. As *C. aspersum* feeds extensively on a variety of plant matter the reduction in available food will affect any other species that competes for the food source. The snail will eat rotting plant matter which is a benefit for breaking down plant matter and returning matter to the soil.

C. aspersum may be used as an indicator of levels of heavy metals in the soil. As they consume various plant matter and derive calcium from soil they uptake other metals (such as lead) and this may be deposited in their shell.

Control methods used in Australia

The Department of Primary Industries and Regional Development of WA describes several methods to control the species including:

- Cultural control: clearing agricultural area from weeds and general refuge that provide ideal moist conditions for snails.
- Biological control: birds, rats, beetles and lizards are currently best predators for snails. May help to introduce ducks, chickens or guinea fowl into vineyards and orchards to eat the snails.
- Chemical control: methiocarb, metaldehyde and Iron EDTA.

<https://www.agric.wa.gov.au/pest-animals/snail-and-slug-control?nopaging=1>

Selective dispersal

C. aspersum may be collected and put in to hibernation by cooling to below 4 degrees. They may then be incinerated and any pathogens they may contain will be destroyed.

Impact on primary industry and property

C. aspersum is a known pest in Australian agriculture and unmanaged will cause destruction of crops. They cannot cause destruction of physical property assets. They are physically incapable of destroying fences, buildings, machinery and the like.

C. aspersum will not compete with livestock for food if managed appropriately with controls. If not managed as a general pest they will feed on vegetation that may be grown for livestock, reducing the supply.

Social impact

C. aspersum (and snails in general) is considered a nuisance around the home mostly in the spring and summer months when they are active. They use home gardens (flowering and vegetable) as food sources, so may destroy efforts at maintaining a pleasant garden view or home grown vegetables to enjoy. They are not considered dangerous. They are safe to handle. There is the possibility they may pass on AC or Salmonella to humans if ingested. This is more of a concern for small children who may put them in their mouth while playing in the garden. It is a rare occurrence.

CONDITIONS OR RESTRICTIONS OF IMPORTING SPECIES

To ensure containment of imported species, appropriate infrastructure should be constructed and maintained prior to importation. There are methods for commercial snail breeding that will ensure this. C. aspersum can breed and grow in a greenhouse environment. They are then protected from being eaten by other wildlife (birds, snakes, rodents etc.) or having access to the environment.

There is commercial grade specialised electric fencing tape for snails. These run off 12 volt systems so very low output that will not cause damage to the snails or humans. The snails can then be kept inside separate containment areas ('rows') within the greenhouse with the electric fencing. They are then contained to specified areas and will not be able to gain access to the walls of the greenhouse. The electric system can be connected to mains power with battery back-up. Worst case scenario the system fails they will still be contained within the greenhouse. Tin (or similar material) can be buried to at least 30cm as a perimeter around the greenhouse to avoid pests (such as rodents and reptiles) from burrowing underground and in to the greenhouse.

PROPOSED ACTIVITY

The reason for importing a species that may be sourced locally is that the number of snails required to start the commercial project is far greater than

what can realistically be sourced from the local area. There is no way to determine the snails chosen from the wild are healthy or what age they are for breeding purposes. Collecting snails from the wild has the risk of contaminating all stock during breeding. The only way known to test the snail for AC or salmonella is to destroy the snail in laboratory testing. There would then be no live stock to start breeding.

The breeding snails will be sourced from a company that specializes in snail farming and they have been grown in a 'closed system' and have never been subjected to their local environment. The company is then assured that the snails are healthy, disease free and within the first year of life and can therefore monitor the breeding production cycles. The proprietor of the company has visited a commercial farm in Europe and has seen documentation for veterinary services in that country ensuring that the stock is certified disease free and healthy. From discussions with the Health Department of Western Australia there is no method currently used in Australia to provide such assurances.

METHOD TO HOUSE THE SPECIES

The company in Europe that the company will purchase the *C. aspersum* snails has been exporting internationally for many years. They follow International Air Transport Association (IATA) regulations and any individual regulations required from the country they export to.

Utilising a 'closed system' to contain the product for sale, the snails are not grown or moved uncontained outside the greenhouse. They are placed in netting bags inside the greenhouse then placed in a hibernation state before being transported refrigerated off property. Using this standard European method a maximum of 26 tonne can be grown in a 1000 metre square greenhouse containment system. This is approved by the veterinary services of the country.

By growing *C. aspersum* in a green-house the snails will be grown in the natural environment which provides soil, grass, sunlight, shade and airflow to keep stock healthy. Overhead reticulation in the greenhouse provides water to drink and the humidity to grow. The greenhouse provides protection from outside predators and also containment from escaping into the wider environment.

STATE AND TERRITORY CONTROLS

Western Australia: Biosecurity and Agriculture Management Act 2007.
Department of Primary Industries and Regional Development – Agriculture and Food.

C. aspersum is listed as *permitted – s11* for the whole state of Western Australia. It is not assigned a control category for local government.

Queensland: Biosecurity Act 2014.
Department of Agriculture and Fisheries.
Schedule 2 Restricted matter and categories. *C. aspersum* is not on this list.

NSW: Biosecurity Act 2015.
Department of Primary Industries.
Schedule 2 Prohibited matter. *C. aspersum* is not on this list.

Northern Territory: Plant Health Act
Department of Primary Industry and Resources.
C. aspersum is not listed as a declared and notifiable pest under section 6(2)

South Australia: Natural Resources Management Act 2004.
Department of Primary Industries and Regions.
C. aspersum is not listed on the established pest animals list.

Tasmania: Plant Quarantine Act 1997.
Department of Primary Industries, Parks, Water and Environment.
Helix Aspersa (*C. aspersum*) is classified as invertebrates that may be imported without restriction.

ACT: Pests Plants and Animals Act 2005.
Environment, Planning and Sustainable Development Directorate.
C. aspersum is not listed on the Pest Plants and Animals (Pest Animals) Declaration 2016 (No 1) section 16.

There is currently no regulatory body for breeding and selling snails on a commercial basis in Australia. No restrictions are in place that the company have been able to determine limiting the sale of *C. aspersum*. There are currently only a couple of commercial farms in Australia that operate on a small scale producing *C. aspersum* for local sales.

Snails sold for human consumption must comply with food safety and handling laws (Food Standards Australia New Zealand - FSANZ).

The Australian Government Rural Industries Research and Development Corporation released a research paper in 2001 regarding the feasibility of commercial heliciculture in Australia. RIRDC Publication No. 00/188.

The company has determined the main limitation to operating as a viable commercial business is the availability of large numbers of appropriately sized, healthy breeding stock to commence operation. Australia has ideal environmental conditions to breed and grow *C. aspersum* as evidenced by the population numbers observed in our environment already. There is a global market for the supply of escargot and Australia is yet to be known in this market.



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