

Rats

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Varietal range difference

Rat strains are almost entirely derived from the Norway rat. Mutations and hybridisations have led to rats with a variety of coat colours and patterns. Rat types can be broadly classified into two main groups: albino and hooded.

Physical characteristics

Size	length from snout to base of tail: 17cm - 21cm; length of tail: 20cm - 23cm; overall length: 37cm - 44cm
Weight	adult male: approximately 300g - 800g; adult female approximately 225g - 400g
Age at adult size	250-300 days
Average life span	2-4 years
Weight at birth	5g - 6g
Gestation period	21-22 days
Number of offspring	6-14 per litter
Weaning age	approximately 3 weeks (30g - 55g)
Range of breeding ages	can reach sexual maturity at 8 weeks; females should not be bred before 65 days; females are continuously polyoestrus (come into season regularly - every 4-5 days - throughout year unless bred); rats can come back into heat 48 hours after giving birth; recommended that rats are not bred after 15 months of age
Body temperature	38 °C
Heart rate	320-480 beats/minute
Respiration rate	70-110 breaths/minute

General biology and normal behaviour

Rats are long-tailed, inquisitive rodents. They are social and, when kept isolated from other rats, may suffer stress. The size of groups should not exceed eight adults or ten juveniles.

They develop stable, well-defined social relationships, often grooming one another.

Desexed rats or single-sex colonies should be kept if not breeding.

Healthy rats are alert, active and inquisitive. They have clear and wide-open eyes. Their ears stand up straight and their fur is dense and sleek. Normal caged behaviour includes running, jumping, standing on their hind legs and some climbing, if cage facilities permit.

Rats are very capable diggers and will build their own tunnels, in which they then sleep if caging allows. Young rats play a great deal and this play is important for their normal social and physical development. Adults play less frequently with each other.

Male rats are more aggressive than females and more inclined to bite, although rats rarely bite without provocation and then only once.

Rats are nocturnal animals and are more active at night. It is normal behaviour for rats to rest huddled together to conserve body heat. Rats may sleep either in the foetal position or at full length with their tails extended. Extension can, however, be a sign of ill health.

Cannibalism is rare but does occur and is usually indicative of inadequate diet or maintenance. Pregnant females show nest building activity before giving birth and during lactation. During the breeding period, it is normal behaviour for males to nibble the females' heads or bodies and to examine their ano-genital areas before copulation.

Environment

Rats should not be housed with any other species. A cage or nesting area should be seen as the animal's home or domain and be disturbed as little as possible. It must be remembered that the environmental requirements of small mammals are complex and imperfectly understood.

Rats require a distinct nesting area away from the feeding location, a dark sleeping/hiding area and a light living area. Nest boxes of opaque or semi-opaque materials provide suitable shelters.

Cages should be at least 300 mm high to allow the animals to stretch into a bipedal stance. Higher cages allow the placement of platforms for climbing.

To house up to three adults or juveniles weighing under 450g each requires a minimum floor area of 1500cm² and for those above 450g, at least 1800cm².

It is recommended that rats be housed in larger cages than these.

Rats like to have floors at different levels in their homes to play on and investigate. Toys, in the form of cardboard or plastic tubes, ladders and ropes, provide play and exercise opportunities, particularly for young rats. Caged rats will exercise spontaneously by playing with cage mates or during feeding.

The optimum temperature range for rats is between 18°C and 22°C. Avoid large fluctuations.

Good natural lighting or artificial light with the full range of spectral colours (60-400 lux) is preferred. Cages should be kept out of direct sunlight and shelter provided within them to allow the rats to avoid light. Students should be able to observe that rats seek darkness if it is available to them. There should be 12-hour periods of both light and darkness. As albino rats are sensitive to light, they should be kept under low-intensity lighting, except when being examined. Rats with dark pigmented eyes are more suitable for the classroom.

Ensure good natural ventilation, without draughts. Rats should be housed indoors.

Bedding should be highly absorbent, free of dust and splinters, non-toxic, non-edible and uncontaminated with pesticides or chemicals. Suggested bedding materials are wood shavings, clean shredded newspaper, soft cardboard, rice hull or absorbent paper or rice-based pellets. The provision of deep litter will partly satisfy the rats' desire to dig and provide an inexpensive form of environmental enrichment.

Cages should be cleaned at least twice weekly, then washed in disinfectant and dried thoroughly. New bedding should be supplied and old bedding disposed of in a suitable manner.

Easily-shredded materials should be provided. Shredded paper, soft cardboard or paper towels allow females to build nests that enhance their feelings of security and decrease infant mortality. Cottonwool should not be used, as it can wrap around the legs of young rats and cause injury.

Food and water

Commercially-prepared rat pellets or cubes are recommended, as they provide all the basic requirements. See manufacturers' recommendations for appropriate quantities. However, rats are omnivores and enjoy variety in their food, so their diet can be supplemented with fresh fruit and vegetables or suitable seeds, such as corn or sunflower. As rats like fresh food, purchase small amounts only. Lactating females must be provided with approximately four times the amount of food and water required by an adult rat.

Rats' teeth grow continuously, so hard-shelled nuts or other gnawing material, such as blocks of untreated timber, must be included to prevent overgrowth.

A clean, adequate supply of water must be available at all times. As rats contaminate water dishes and bowls, suspended sipper bottles of adequate size are required.

Handling

Rats need to be handled calmly and with care to prevent distress and injury to the animals and the handlers. Catching them is assisted by well-designed refuges. If rats hide under structures such as elevated shelves or nest boxes they can be caught without struggling.

Always approach a rat from behind and grip it firmly with the thumb and forefinger, forming a circle round the neck. The head and one front paw should be included in this grip while the second front paw is held between the forefinger and middle finger. Use the other hand to support the pelvis and tail from behind and hold the rear paws between the thumb and forefinger.

Disease prevention

Disease control methods and internal and external parasite control programs should be developed in consultation with veterinarians. All activities must be documented in the appropriate records.

Signs of illness

The first sign noticed is a change in the animals' natural demeanour. They may be listless or lethargic. Closer examination may show:

- discharges from eyes, nose, urinary or genital organs;
- sores, scabs or areas of fur loss;
- coughs and sneezing;
- lumps under the chin, due to enlarged glands;
- constant scratching;
- lack of balance, stumbling or stiff-legged gait;

- soft faeces, with an unpleasant smell;
- loose skin (a possible sign of weight loss), prostration or extension; or
- lumps in or under the skin, due possibly to tumours or abscesses.

Excessive grooming by rats can be an indication of stress. A failure to thrive or grow is another sign of illness. Animals with any of these symptoms should be isolated immediately from other animals and their cages disinfected fully.

If a rat shows signs of ill-health or distress, veterinary advice should be sought immediately. Illnesses, injuries and treatment given must be documented in the appropriate records including the SAEC's [Form C1](#).

Euthanasia

In the case of a rat becoming so sick, diseased or injured that recovery is unlikely or undesirable, on humane grounds euthanasia must be arranged with a veterinarian or a person competent in the technique for rats.

A record of deaths is required for the annual report, [Form D](#), to SAEC and all deaths resulting from unexpected or adverse events must be reported immediately to the SAEC using [Form C1](#) and [Form C2](#).

Fate plan

A fate plan should be considered before using a rat in any program. Rats that are no longer required must be re-homed.

Further information

Relevant websites include:

- [American Society for the Prevention of Cruelty to Animals](#)
- [Australian and New Zealand Council for the Care of Animals in Research and Teaching](#)
- [RSPCA UK](#)
- [Universities Federation for Animal Welfare](#)

Relevant texts include:

- McGreevy, P. (2002) *Handle with Care*. Sydney: Halstead Press.
- Universities Federation for Animal Welfare (1999). *The UFAW Handbook on the Care and Management of Laboratory Animals*, 7th ed. Oxford: Blackwell.