

Rodents Reproduction and Breeding

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Reproductive basics

- Male rats reach sexual maturity at about 6 to 10 weeks of age; females reach maturity at 8 to 12 weeks ([Quesenberry and Boschert, 2024](#),
- The average gestation time is 21 to 23 days. Pregnancy is sometimes detectable at about 2 weeks by feeling the abdomen or noticing weight gain or mammary (breast) development.
- Pregnant females will make a nest, and they should be provided with suitable materials.
- Tissue paper provides excellent material for nesting.
- Baby rats' (pups) usual litter size is 8 to 18 pups.
- Baby rats are born deaf and blind.

Reproductive management

- The cage should be kept in a quiet place and the litter should not be disturbed for at least 7 days after birth, especially if this is the female's first litter.
- Weaning occurs about 21 days after birth.
- Female rats can quickly become pregnant again after giving birth.
- It is not healthy for a female rat to be both pregnant and nursing a litter.
- The female be given a rest period of at least 2 months between pregnancies and litter rearing.
- Breeding and reproduction in rats can decrease because of factors such as age, malnutrition, abnormal light cycles, cold environment, cysts on the ovaries, tumors, and inadequate nesting material.
- Pregnant females may abort, abandon, or eat their babies.
- Inadequate food, lack of water, overcrowding, inadequate nesting or sickness, lead to loss of babies.

Rates Description

- Adult female rats typically weigh 350 to 450 g, and adult male rats usually weigh 450 to 650 g.
- They are about 9 to 11 inches long without the tail. Male rats are usually larger than females.
- Pet rats are available in several colors and coat patterns because of specialized breeding.
- The common color variations include brown, black, tan, gray, and white, with both lighter and darker shades as well.
- Some of the more exotic colors are Siamese, blue, silver black, silver fawn, lilac, cinnamon, black-eyed white, cinnamon pearl, lynx, silver agouti, silver lilac, and blaze.
- Rex rats have a curly coat.
- Tailless rats are born with no tails and hairless rats have no fur.
- The usual lifespan of rats is about 1.5 to 3 years.

Rats at a glance

Life span	1.5 to 3 years
Length	Body: 23 to 28 cm; Tail: 18 to 23 cm
Weight	12 to 23 ounces (350 to 650 g)
Cage temperature range	18°C to 26°C
Relative humidity	30% to 70%
Breeding age	6 to 12 weeks
Estrous cycle	4 to 5 days
Gestation period	21 to 23 days
Litter size	8 to 18 young
Weaning age	21 days

Special Considerations

- Domesticated rats are social, active, and intelligent, and they make good pets.
- They are nocturnal by nature and usually spend most of their time sleeping.
- In general, pet rats rarely bite.
- The best way to pick up a rat is to grasp it gently over the shoulders and lift it up while supporting the body with your hand.
- Move slowly to avoid startling the animal, and watch its behavior.
- A rat that rears up to face your approaching hand is more likely to bite.
- Rats are social animals and need company; it is better to keep them in a group.
- However, they are also very prolific breeders, so keeping only rats of the same sex in the same cage is recommended.
- When new groups of animals are housed together, they should be watched carefully for fighting.
- They have a limited capacity to regulate their body temperature and do not sweat or pant.
- They regulate their body temperature through dilation or constriction of the veins in their tail.
- Rats should be kept in a temperature range of 18°C to 26°C with 30% to 70% humidity.
- Temperatures above 30°C can cause heat exhaustion, especially if the cage is overcrowded.

Selecting rats and providing home

- When selecting a rat from a pet store or animal shelter, make sure that all the rats look healthy and alert, and that the animals are kept in clean and comfortable conditions.
- If any of the rats show sickness, diarrhea or any bad smell, the rats may have been exposed to an infectious disease.
- Individual rats should have clean, shiny fur, and the eyes and nose should be clear of any discharge.
- Rats that have been handled should not be too skittish and are often naturally curious about humans.
- Because they are nocturnal, it is a good idea to view rats in the early evening when they are more likely to be fully alert.
- A cage should have good ventilation, be easy to clean, and be escape proof.
- It should have enough space to allow for some exercise, as well as areas for feeding and nesting.
- Extra space should be allowed if several rats are housed together.
- The cage floor should be solid; wire mesh or grid flooring can damage rats' feet and legs.
- The bedding and floor covering should be absorbent.
- Recycled paper products marketed as bedding are safe and easy to clean.
- A water bottle with a hanger that allows rats to easily drink water can be used.
- Food dish, should be easy to clean and sturdy enough to prevent tipping.
- An unclean cage with poor quality bedding materials can increase the risk of bacterial and viral infection in rats.
- The cages should be cleaned with hot water and a pet-safe disinfectant at least once a week.

Healthcare

- Appropriate housing, a nutritious diet, good hygiene, and considerate care will minimize disease problems for your rat.
- Injuries can be prevented by keeping your pet in a cage free of hazards and handling it gently.
- There are currently no vaccines for rats or other small rodents.
- You should regularly examine your rat for any general signs that might indicate trauma, or disease.
- These include loss of appetite or weight, hunched posture, discharge from the eyes or nose, hair loss, matted or fluffed fur, signs of trauma (bites, wounds, limping), or general dullness.
- Rats should be examined annually for subtle signs of illness early and can help prevent illness.
- Loss of appetite or energy, dull coat, a puffy appearance of the coat, loud or raspy breathing, and labored breathing are all early signs of illness
- The Harderian gland, which lies behind the rat's eyeball, secretes a reddish-brown substance, red tears, may be a sign that your rat is ill or stressed.
- Head tilt, often called "wry neck," is another sign of illness in rats.

Zoonotic diseases

- Infections, parasites, and cancer are some of the most common types of diseases and disorders in rats.
- Providing a balanced diet, proper housing, and routine veterinary care will help maintain your rat in the best condition possible.
- The following zoonotic diseases may transmit from rats to the people:
 - Borreliosis
 - Leptospirosis
 - Melioidosis
 - Plague
 - Rat bite fever
 - Tularemia
 - Murine typhus
 - Hymenolepiasis (rat tapeworm)
 - Salmonellosis
 - Ringworm

Assisted Reproductive Technologies

- Over the past two centuries rats have been recognized as an excellent experimental animal model in numerous biomedical research applications ([Yugel Agka, 2020](#)).
- Rats have commonly been used in studies involving sex steroid hormone action, GnRH action mechanism, age-related changes in GnRH neurosecretory function, and menopause.
- Extensively used to study cellular, molecular, morphological, physiological, and functional changes associated with male and female gamete and embryo development, adverse effects of environmentally hazardous substances, reproductive cycle, epigenetics, and phenotype.
- Significant progress has been made in follicular isolation, in vitro oocyte maturation, spermatogonial stem cell culture, establishment of embryonic stem cells, preimplantation embryo development, microinjection and insemination, and effective germplasm cryopreservation.
- These state-of-the-art germplasm biotechnologies in combination with novel genome editing technologies have accelerated the creation of new transgenic and knockout rat models without strain limitation.
- Assisted reproductive technologies, germplasm cryobanking, and genetic modification have been reviewed in rats.