



# Care of Rats and Mice

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People envision many different things when thinking about rats and mice. Some consider them as vermin or pests, many envision laboratory specimens, others think of them as snake food, while a chosen population treasures them as pets. These rodents make excellent pets for children if they are handled with care. These timid and social pets are fun to watch performing their natural behaviors of burrowing, searching for food, and playing. Unlike their wild counterparts, who are typically nocturnal, pet rats and mice have periods of activity both day and night. Rats and mice are inexpensive, easy to care for, and responsive to handling.

## DIET

As with any pet, good quality food and clean, fresh water must be provided at all times. In the wild, these animals feed on leaves, seeds, roots, fruits, and insects. Pelleted rodent rations are recommended for feeding in captivity, which are processed as dry blocks or pellets. Typical maintenance diets contain about 14% protein and 4 to 5% fat, while diets for growth and reproduction contain 17 to 19% protein and 7 to 11% fat. Seed diets are also formulated for mice and rats, but these diets should only supplement the basic rodent pellet as a treat item. Rodents prefer sunflower-based diets to pellets, but these seeds are low in calcium and high in fat and cholesterol. When fed exclusively, seed diets can lead to obesity and nutritional deficiencies.

The pet's appetite should be monitored closely. Many factors affect the rodent's food intake, including: the ambient temperature, humidity, food quality, breeding status, as well as the pet's health status. On average, an adult mouse will consume about 15 gm of feed and 15 ml of water per 100 gm body weight daily. Comparatively, an adult rat will consume approximately 5 gm of feed and 10 ml of water per 10 gm body weight daily. Rats and mice typically eat at night.

Water should be provided in water bottles equipped with sipper tubes. The sipper tube keeps the water free from contamination. The tubes must be positioned low enough to allow the pet easy access. Inadequate water consumption leads to dehydration, lower body weight, infertility and death. These rodents drink only a fraction of the total bottle volume, but the bottle should be emptied, cleaned and refilled with fresh water daily.

## HANDLING

Pet rodents become tame and seldom bite when properly restrained and accustomed to handling. Be careful, however, when approaching a nervous or frightened pet. Also, it is best not to disturb a

sleeping animal because most are usually quite cranky when awakened. Some rats can be very territorial of their cage, and should be coaxed out of the cage before being handled. Mice housed individually may be more aggressive and apprehensive than those housed in groups. Most pet mice and rats enjoy being handled when away from their cage.

Rats and mice can be easily picked up by scooping them into a can or cupped hands. They can then be moved out of their territory to a neutral area. Mice can also be lifted by grasping the base of the tail. Rats can be picked up this way, but be careful not to injure them due to their larger size. For any rodent, never pull on the tip of the tail because the skin can easily tear and is painful.

A mouse can be further restrained by grasping over the back and rib cage, while restraining the head using a thumb and forefinger positioned on either side of the neck. To initially pick up a rat, it may be necessary to grasp the tail base as suggested above. Rats do not respond well to scruffing by the nape as described for the mouse, but it may be necessary in some cases.

## HOUSING

Several suitable types of cages are available for housing small rodents. Many of these units come equipped with cage "furniture" such as exercise wheels, tunnels, and nest boxes. These accessories contribute to the pet's psychological well being. Cages should be constructed with rounded corners to discourage chewing. Rodents readily chew through wood and thin plastic. Recommended caging materials are wire, stainless steel, durable plastic and glass. Glass and plastic enclosures restrict ventilation and may lead to temperature and humidity problems. These materials are acceptable when at least one side of the enclosure is open for air circulation.

These pets thrive in solid bottom cages with deep bedding and ample nesting material. Bedding must be clean, non-toxic, absorbent, and relatively dust free. Shredded paper, pine shavings and processed corn cob are acceptable beddings. Wood shavings and ground corn cob must be free of mold, mildew or other contamination. Cedar chips or chlorophyll scented shavings should be avoided because of association with respiratory and liver disease. At least one inch of bedding should be provided to allow for normal burrowing behavior. Cotton and shredded tissue paper make excellent nesting materials.

Adult mice require a minimum floor area of 15 square inches and a cage height of 5 inches. Rats need at least 40 square inches of floor space and a minimum of 7 inches in height. Breeder mice and rats require much larger areas. Optimal temperature range for these pets is between 65 to 80 degrees Fahrenheit, with a relative humidity of 40 to 70%. Twelve hour light cycles are preferred, with most rodents being more active during the night.

Pet rats and mice can be housed singly or in groups. These rodents are colony oriented by nature. However, occasionally an overly aggressive mouse or rat may have to be caged individually. Territorial disputes also develop when the cages are overcrowded or when they lack food or water. Group cages should be provided with multiple food and water sources.

As a rule of thumb, the cage and accessories should be thoroughly cleaned at least once weekly. An exception to this schedule is when newborn babies are present, then wait until they are at least 10 days old. Other factors that may require increased frequency of cleaning are the number of animals in the cage, the type of bedding material provided, and the cage design and size. Cages should be sanitized with hot water and non-toxic disinfectant or detergent, and then thoroughly rinsed. Water bottles and food dishes should be cleaned and disinfected daily.

## **BREEDING**

Sex determination is the first step to breeding success. Fortunately, mice and rats are fairly easy to sex. Neonatal male rodents can be distinguished from females by a greater distance between the anus and the urinary opening. Males have a one and a half to two times greater distance between the anal and urogenital openings. Sexually mature male rodents also exhibit a prominent scrotum. Females can be identified by their prominent bilateral rows of nipples.

Sexually mature mice and rats need to be properly paired to avoid fighting and permit successful mating. Adult male mice often fight when caged together, especially in the presence of females. Therefore, a single male mouse should be housed with one or more mature females. Rats, on the other hand, usually can be caged in mixed groups of males and females without aggression.

Female mice become sexually mature at about 50 days of age. They have an estrous (“heat”) cycle every 4 to 5 days throughout the year, unless they are bred. Female mice are usually receptive to males for about 12 hours of this cycle, typically at night. They also have a fertile postpartum estrus, which means that they can be bred within 24 hours after giving birth.

Gestation in mice lasts approximately three weeks, but can be up to ten days longer if the pregnant female is also nursing a litter. Litter size averages 10 – 12 young. Small litter size is common with a female’s first litter or older females. New litters should not be disturbed for the first few days to minimize injury or abandonment by the mother. Baby mice are weaned at about three weeks of age. Female rats become sexually mature at about 65 days of age. They have an estrous cycle every 4 to 5 days throughout the year. Breeding usually occurs at night during a 12 hour period of receptiveness to the male. They also have a fertile postpartum estrus, and can be bred within 48 hours after giving birth. However, unlike mice, this usually does not occur because the male should be removed from the cage prior to the female giving birth to avoid injury to the pups by the male.

Pregnancy lasts about three weeks in rats as well. Litter size averages 6 to 12, but smaller litters are common as described for mice. The female and her litter should not be disturbed for the first few days after birth, because a stressed female rat may injure or destroy her pups. Rats are weaned at about three weeks of age. The female will resume her normal estrous cycle within 2 to 5 days after the young are weaned.

## MEDICAL CONDITIONS

### **Chronic Murine Pneumonia (Murine Mycoplasmosis)**

*Mycoplasma pulmonis* is a very elusive bacteria which causes one of the most common and serious infections of rats and mice. The organism is difficult to isolate by standard laboratory culture procedures. As a result, a presumptive diagnosis is typically made based on the patient's signs and symptoms.

Signs of mycoplasmosis include sniffing, sneezing, labored breathing, squinting, red-brown tearing, and a rough hair coat. If the inner ear becomes infected, a head tilt and neurologic signs develop. In addition to respiratory signs, a genital infection may occur. Manifestations of the genital form include infertility, embryonic resorption, and small litter size. Compromise to the respiratory tract by other bacterial or viral infections or exposure to inhalant irritants can increase the severity of mycoplasmosis. The disease runs a chronic course, which may result in death if not treated early.

Antibiotic therapy should be initiated at the first suspicion of infection. Due to the chronicity, long term treatment by antibiotics in the drinking water may be necessary to suppress the infection. Severely affected individuals may need injectable medications and extensive supportive care. In addition, secondary infections with other organisms are common, sometimes requiring the use of multiple medications. The goal of therapy is to reduce the severity of symptoms, but complete elimination of the infective bacteria is practically impossible.

The disease is highly contagious. The bacteria are spread by direct contact with affected individuals or from an affected mother to her unborn young while still in the womb. Transmission usually occurs through respiratory aerosol and sexual activity. Rabbits, guinea pigs, and other rodents can serve as carriers of the disease without exhibiting clinical signs. Other mice and rats can also serve as carriers. It is extremely important to restrict contact between mice and rats of unknown health status until a quarantine period has elapsed. A quarantine period of four to six weeks is recommended. Any animal exhibiting even the slightest signs of respiratory illness should remain isolated.

### **Tyzzler's Disease**

A common infectious disease of rodents is Tyzzler's disease, caused by bacteria (*Bacillus piliformis*) that infect living cells. The disease causes a high death rate in young, stressed rodents; particularly mice and gerbils. Clinical signs are nonspecific, but primarily appear as ruffled fur, lethargy, hunched posture, and poor appetite. Diarrhea may also be present. The disease causes changes in the heart, liver, lymph nodes, and digestive tract which can be observed at necropsy.

Prevention is the key to this disease. Strict sanitation and minimal stress greatly reduces the occurrence of this disease in colony situations. This disease can be carried by apparently normal looking rodents which can cause disease in others. Tyzzler's disease usually affects rodents that are

stressed by weaning, shipping, and adjusting to new environments. Thorough sanitation prior to introduction of a new animal is important in preventing outbreaks.

### **Sendai Virus**

The Sendai virus causes one of the most significant and severe respiratory infections of laboratory rodents. Suckling and weaning mice are most commonly affected, posing a serious problem to mouse colonies. Other affected species include rats, hamsters, guinea pigs, and swine. It is unlikely for a pet mouse to become infected unless it was acquired from an affected colony.

Signs of infection are usually expressed in nursing mice, while affected adult mice rarely show symptoms. Signs include labored breathing, chattering, rough hair coat, weight loss, and death. Secondary bacterial infections often worsen the disease, resulting in a higher death rate. Sendai virus infections are usually subclinical in other susceptible rodents, but these species may be a source for infection in young mice.

There is no specific treatment for this disease. Supportive care and treatment of secondary bacterial infections may lessen the severity of signs. A vaccine is available, but it is only practical for use with large colonies of affected mice. Prevention involves selecting pet mice from a Sendai virus-free source and keeping them isolated from mice of unknown backgrounds and other susceptible rodents which may carry the disease.

### **Sialoadenitis**

Rats are the natural host for the highly contagious viral disease. The disease is usually self-limiting in young rats. Recently weaned mice may also be affected. The disease is spread from affected individuals through respiratory aerosol or direct contact with respiratory secretions. Infected rodents carry and secrete the virus for about seven days.

Signs are variable depending on the age and immune status of the affected rat or mouse. The most serious signs are seen in 2 to 4 week old rats with no maternal antibody protection. Initial symptoms include squinting, blinking, and rubbing of the eyes. Sneezing and swelling in the neck area develop later. Finally swellings below or around the eyes, bulging of the eyes, production of red-brown tears, and self-trauma to the eyes are noted. Respiratory signs may be present, especially if complicated by Sendai virus or murine mycoplasmosis. The affected rat usually remains active and eating during the course of this disease.

### **Neoplasia (Tumors & Cancer)**

Rats and mice are very susceptible to the development of tumors. It is reported that rats over two years of age have an 87% chance of developing tumors. The most common type of cancer in the rat is mammary fibroadenoma (breast cancer). Numerous other forms of cancer occur, but to a lesser degree. Mice develop tumors in a wide variety of tissues, both internal and external. Leukemia, cancer of the white blood cells, is also common in the mouse.

The most common type of cancer in these pets is the mammary tumor of rats. This form of breast cancer can occur in both female and male rats. Since rats have widely distributed mammary tissue beneath the skin, it is not unusual to find these tumor lumps behind the front legs, along the sides, in the flanks, as well as along the underside of the body. These tumors can be removed surgically, but often recur. If not treated and surgically removed, these masses continue to enlarge, ulcerate, and become infected. Early surgical removal allows for the best outcome with the least chance of complications or recurrence.

### **Red Tears (Porphyrin) of Rats**

Rats secrete red tears from a gland behind their eyes. This is a normal secretion of porphyrin pigments produced by the harderian gland. These tears are often mistaken for blood. They usually appear during stressful situations and disease. The eyelids, nares, and forepaws may be smeared with the pigment. When present, the underlying cause of stress should be sought and relieved.

### **Ring Tail**

Low humidity and high temperatures may result in ring tail of young rats. Ring tail presents as constrictive bands along the tail. Other factors which have been implicated in this condition include the vascular structure of the tail, the presence of endotoxins, and high dietary lipids. Treatment involves correcting the environmental conditions.

### **MOUSE AND RAT FACTS**

	<u>Mouse</u>	<u>Rat</u>
Life Span	1.5 – 3 years	2.5 – 3.5 years
Cage Temperature	65 - 80°F	65 - 80°F
Relative Humidity	40 – 70%	40 – 70%
Breeding Age	50 days (male) 50-60 days (female)	65-110 days
Estrous Cycle	4 – 5 days	4 – 5 days
Gestation Period	19 – 21 days	21 – 23 days
Litter Size	10 - 12 young	6 – 12 young
Weaning Age	12 - 28 days	21 days