

LABORATORY RABBIT AND GUINEA PIG HUSBANDRY

Rabbits

Rabbits used in research or for breeding in a laboratory should be obtained from a reputable commercial supplier. They are alert, docile, timid animals that readily adapt to cage housing. Rabbits are used in biomedical research, safety testing, and in serology studies as they readily produce serum antibodies in response to a wide variety of antigenic stimuli. Two major disadvantages in using rabbits in research is the difficulties with anesthesia and that they can be plagued by a number of spontaneous diseases.

Breeds- The New Zealand White (NZW) is the most widely used breed in the lab because their medium size and docile nature make them easy to work with, plus their large unpigmented ears facilitate repeated venous manipulations. Unfortunately these rabbits tend to become very heavy with age which makes them awkward to handle and prone to sore feet.

Caging- It is suggested that, for laboratory purposes, rooms designed to accommodate units of 50-60 rabbits are best. If metal caging is used, 16 mm mesh; 2 mm gauge wire is satisfactory in order to preclude sore hocks. These are often built with portable sides with or without a roof or raised grid floor. They may be used to house a variety of species such as cats, dogs and NHP. Rabbits and guinea pigs have also been successfully housed in floor pens. In Swiss studies, near-to-nature surroundings for rabbits have been replaced by manageable artificial substitutes.



Rabbit in suspended flooring cage

Cage Density-In their natural habitat in the wild, rabbits of the genus *Oryctolagus* are social animals, frequently living in warrens of up to 100 or more rabbits of various ages. In the laboratory, convention has dictated that sexually mature animals be housed singly: a) to avoid fighting injuries; and b) to prevent ovulation and subsequent pseudo pregnancy due to physical interaction in mature does.

Male rabbits, if penned together, become increasingly aggressive from about 90 days. However, group housing of female rabbits has been successfully done at some facilities as long as the established group remains a closed colony. Group housing in larger enclosures has provided animals with the opportunity to live a more natural lifestyle, including ample opportunity for adequate exercise, mutual grooming, and general improved well-being.



Rabbits in suspended flooring cage



Rabbits group housed on the floor

Artificial Enrichment- The use of resting boards has been shown to have a calming effect on rabbits, which use them to hide beneath, and the use of tubing as "bolt holes" has been suggested. Rabbits like to chew so supplying items that allow them to exhibit this behavior is ideal. Such items could be: alfalfa cubes, bunny blocks, stainless steel bowls, chains, pieces of wood, etc.



Enrichment items



Bolt hole for rabbits to hide under

Methods of Identification- Microchips, tattoo in ear, ear tag, permanent marker in ear.

Unique Physiological Facts:

- Have 4 upper incisors set in a square formation (two short peg teeth set immediately behind the two front teeth)
- The bones of rabbits are extremely light and brittle and can fracture easily. Fractures of the lumbar vertebrae are often seen if the animal struggles a lot; if a fracture occurs the rabbit should be humanely euthanized
- When a rabbit is too hot it will dissipate heat by increasing blood flow to the ears
- Microbial digestion of cellulose occurs in the cecum. Once the cellulose has been broken down, the resulting feces, called cecotropes, is consumed directly from the anus by the rabbit (called coprophagy). Cecotropes contain volatile fatty acids, vitamin B & K, and a source of protein from the microbes themselves
- Rabbits cannot vomit due to the esophagus lacking reverse peristalsis and strong cardiac and pyloric sphincters
- Large amounts of calcium from consumed food is excreted in the urine, giving it a cloudy appearance

Breeding- Rabbits are induced ovulators, they do not spontaneously ovulate. After stimulation of mating they will release an egg within 10-13 hours. Mountings by other does can cause ovulation, which results in a pseudopregnancy which will terminate after approximately 20 days.

The doe is always taken to the bucks cage because the female is highly territorial may try to attack the male if he is released into her cage. If a mating is going to occur, it will take place within 30 minutes; if it doesn't, a different male should be tried the next day.

Parturition (kindling) usually occurs early morning and is rarely observed as it usually only takes 30 minutes to deliver 6-10 young (kits).

Signs of Ill Health- When group housed, an unwell rabbit will exhibit a distinctly different behavior pattern to that of the rest of the group and is usually noticed away from the group, hiding in a bolt hole. If housed in suspended caging, it often isn't inquisitive when a person enters the room, staying at the back of the cage.

Infectious Diseases- Rare due to intensive health monitoring/screening practices of reputable commercial suppliers.

Miscellaneous Diseases:

- ❖ Malocclusion-a genetic condition resulting in the incisors not properly occluding therefore the teeth do not wear properly and the teeth over grow. Once the teeth are over grown, the rabbit cannot eat, resulting in weight loss and excessive salivation
- ❖ Sore hocks- a condition found in over weight rabbits housed on mesh floors characterized by ulcerated lesions found mostly on the bottom of the hind feet where rabbits bear most of their weight. Treated with antibiotics and a rubber mat which allows the rabbit to get off the mesh floor.
- ❖ Broken back- characterized by hind end paralysis. Prevention of this injury is good handling techniques and placing the rabbit rear end first into the cage.
- ❖ Moist Dermatitis- Exhibited in two forms:
 - a) Sore Dewlap-caused by constant wetting of the fur by malocclusion or drinking out of water bowls. Area should be clipped and a topical antibiotic applied; should also remove source that causes excessive wetness.
 - b) Hutch burn-caused by prolonged contact with liquid feces (diarrhea) or urine. Husbandry techniques need to be improved to prevent further contact with urine or feces; area should be clipped and a topical antibiotic applied.
- ❖ Heatstroke- If ambient temperature is higher than body temperature, heat stroke can occur. Ideal room temperature should be 20° C
- ❖ Hair balls- a problem that leads to loss of body condition and even death. Treat with hairball preventative.

Guinea Pigs

Guinea pigs are the only members of the rodent suborder Hystricomorpha that are widely used as laboratory animals. In the 1930's guinea pigs gained their reputation as a research animal for microbiological studies as they are especially susceptible to bacterial infections.

Breeds- Outbred strains include Dunkin-Hartley, Hartley and the hairless albino strain IAF. Inbred strains are rarely used.

Caging- In guinea pigs, easily sanitized boxes with an end opening, placed in the floor pens, have proven to be an unqualified success. These boxes serve as a place to hide and as a secure place for farrowing, and provide some variety in the environment.



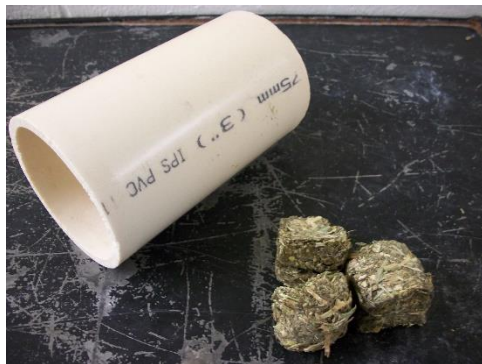
Guinea pigs in a cage

Cage Density- Guinea pigs live in groups of five to ten individuals in the wild and thrive under group housing, although it is unlikely that two or more sexually mature males will live together without incident unless they have been together since birth. In their natural environment, guinea pigs exhibit a strong herd or family orientation, and this should be maintained in the laboratory setting, if at all possible. The one boar per harem arrangement is the recommended procedure in breeding colonies. Guinea pigs should not be housed singly; however, if this is necessary, a minimum area of 700 cm² is recommended. Vocalization appears to play an important part in guinea pig social behaviour, and they call for attention from human caretakers. Guinea pigs have been known to barber their cagemates.



Guinea pigs grouped together in a cage

Artificial Enrichment- Large diameter PVC tubes have successfully been used as "bolt holes" with guinea pigs.



Enrichment items

Methods of Identification-Microchips, tattoo in ear, ear tag, permanent marker on fur.

Unique Physiological Facts:

- Hystricomorphs are characterized by their relatively long gestation periods
- Guinea pigs have a poorly developed capability for jumping or climbing so they may be housed in low walled, open topped pens
- The female has only two nipples and mammary glands located in the inguinal region but are still capable of raising litters of four or more
- Newborn guinea pigs are born precocious; they are in a relatively advanced state of development and mature very rapidly, often eating solid food at 5 days of age
- There is no crevice between the anal and urethral openings in the male
- Automatic watering systems should never be used with guinea pigs as they are notorious for playing with their water

- All guinea pigs require supplemental Vitamin C as they are unable to synthesize it themselves
- Guinea pigs are highly sensitive to antibiotics, particularly those for gram-positive organisms because their normal gut flora contains many gram-positive organisms and when these are killed by the antibiotic, an overgrowth of Clostridia spp will occur, leading to death within 96 hours.
- They all practice coprophagy
- All teeth are hypsodontic (open rooted) so they will grow continuously
- Guinea pigs are the most vocal; they can squeal, chirp, whistle, chatter, whine, purr and grunt

Breeding- If planning on breeding guinea pigs, sows must be bred before 7-8 months of age as by 9 months of age the pubic symphysis ossifies and dystocia will be a problem. There is usually no fighting between the sexes or amongst the females. The two breeding systems generally used in guinea pigs are:

1. Monogamous Pair-1 female to 1 male
2. Harem-2 to 10 females to 1 male

Signs of Ill Health- When group housed, an unwell guinea pig will exhibit a distinctly different behavior pattern to that of the rest of the group and is usually noticed away from the group, hiding in a tube. Singly housed animals are often docile and lethargic. A sick guinea pig should be handled gently to avoid cardiac arrest during examination.

Infectious Diseases- Rare due to intensive health monitoring/screening practices of reputable commercial suppliers.

Miscellaneous Diseases:

- ❖ Scurvy-Animals lacking in Vitamin C are reluctant to move, have swollen joints, diarrhea, and skin lesions. Treat by giving Vitamin C every day, by chewable tablets or adding ascorbic acid powder to drinking water
- ❖ Pregnancy toxemia- Occurs towards the end of pregnancy (usually 14 days or less) in an obese sow due to consuming high levels of concentrated diet which leads to large fetal growth and size. If the sow has many litters in a row she may not be able to consume enough calories to support herself and the growing fetuses which results in her body attempting to produce carbohydrates from fat, which leads to the production of ketones. This results in hypoglycemia, hyperlipidosis and ketosis. The best treatment is to control food intake and provide enough roughage throughout the pregnancy so that the sow is able to maintain an optimum body weight.
- ❖ Slobbers- caused by malocclusion of the molar teeth; the maxillary cheek teeth grow laterally and the mandibular teeth grow medially Herbivores produce copious amounts of saliva, and when the oral cavity is not functioning properly due to overgrowth of the molars, drooling is the end result. The condition is called slobbers because the mouth, chin and chest become moist from the excessive drooling. This condition can be genetic, dietary, or both.
- ❖ Alopecia- Can be due to barbering, or hair loss may be a result of the animal chewing its own hair out of boredom. Environmental enrichment should be provided at all times unless contraindicated by experimental design.

Physiological and Nutritional Parameters on Guinea Pigs and Rabbits *

SPECIES	Rectal Temp. °C ±0.5	Resp. Rate/ Mean and (range)	Heart Rate/ Mean and (range)	Average Daily Water Consumption	Urine Excreted Daily	Daily Feed Recommendations	Digestible Protein** %
GUINEA PIG	39.0	86 (42-104)	280 (230-380)	12-15 ml/ 100 g body wt	15-75 ml	20-35 g + Vit. C supp.	25-30
RABBIT	39.0	40 (32-60)	260 (130-325)	80-100 ml/kg body wt	50-90 ml/kg body wt	75-100 g	14

* Averages and ranges derived from literature mean values for **young adult animals** under various conditions (from various sources).

** Refers to (ideal or digestible protein required; crude protein (CP)) levels in most prepared laboratory animal diets may be considerably higher.

Breeding and Reproduction Data on Guinea Pigs and Rabbits:

SPECIES	Breeding Age	Length (days) Cycle Type	Duration of Sexual Receptivity	Breeding Behaviour and Season	Gestation Range	Litter Size and Range	Optimal Reproductive Span
GUINEA PIG	3 months	15-19 days Polyestrous	6-14 days	Harem (1♂ to 6♀) All year	59-72(65) days	2-6	2 years
RABBIT	6-9 months	Induced Polyestrous	Ovulation variable	Polygamous/Hand mated ♀ <u>to</u> ♂ All year	28-34 (31) days	6-10	3 years