

Caring for Animals

A Guide to Animals in the Classroom



Caring for Animals

A Guide to Animals in the Classroom



The American Association for Laboratory Animal Science (AALAS) is a nonprofit association that serves as a forum for the exchange of information and expertise in the care and use of laboratory animals. Since 1950, AALAS has been dedicated to the humane care and treatment of laboratory animals and has supported the advancement of science benefiting people and animals. AALAS members are people and organizations concerned with the humane care and use of animals in research.

Any suggestions or comments about this booklet should be addressed to education@aalas.org.

Copyright 2008 by the American Association for Laboratory Animal Science (AALAS). All rights reserved.

While every effort has been made to ensure the accuracy of information contained herein, the publisher, editor, and contributors are not legally responsible for errors or omissions.

This edition printed October 2008 in the USA by Toof Commercial Printing.

Cover design by Noah Babiarz. Desktop publishing by Nicole Brown.

Should You Have a Pet in Your Classroom?	3
Animals in the Classroom: Allergy and Asthma Considerations.	5
Establishing an Animal Care Committee	7
Species-specific Animal Care Sheets	
African Clawed Frog	9
Gerbil	11
Guinea Pig	13
Hamster	15
Mouse	17
Rabbit	19
Rat	21
Snake	23
Turtle	25
Signs of Pain and Distress in Classroom Animals.	27
Signs of Common Diseases in Classroom Animals	29
AALAS Position Statement: The Use of Animals in Precollege Education	31

Introduction

Having a pet in the classroom can be a rewarding educational experience for students and teachers. In addition to providing your class the pleasure of interacting with an animal, a classroom pet can be a resource for learning about the behavior, biology, and needs of a particular animal in a live setting. However, no project of this type should be undertaken without a great deal of thought about how to ensure the humane care and well-being of the animal being brought into the classroom.

- What type of food does your new pet eat?
- How do you take care of it over the weekend?
- What other issues must you consider before bringing a rat into the classroom?
- What kind of housing environment does your pet require?

AALAS has developed a series of fact sheets providing information on the care of a variety of animals often found in a classroom setting. These fact sheets provide biological information about the animals, advice on housing and feeding needs, handling tips, and precautions with respect to the welfare of both the animals and people. The most common diseases affecting these particular species are also described in order to assist the students and teachers in recognizing signs that would indicate the need to consult a veterinarian.

To enhance the well-being of both the classroom members and the animals, AALAS recommends that teachers and stu-

dents form a school-wide or classroom-specific Animal Care Committee with the responsibility of developing a classroom animal care proposal before the animals are brought into the classroom. This committee would also oversee the animal care during the school year, including weekend and holiday care.

We hope you will share this information with the teachers in your school. These sheets are perforated so that you can tear a specific sheet from the packet to give to other teachers or make copies. Additional copies of this booklet and other resources are available at <http://www.kids4research.org>.



Should You Have a Pet in Your Classroom?

If you are thinking about adopting a classroom pet, there are several things you should consider. First, why do you want a pet in the classroom? Then, consider the practical aspects of this decision. How will this pet be cared for on a daily basis, and who will have the responsibility to do so? Finally, think long-term. If all goes well, the classroom pet will still be there at the end of the school year. What happens then?

Why do you want to have a pet in your classroom?

Do not get a pet if your answer matches any of the following statements:

- To try to raise the interest level of your students.
- To make your classroom more attractive to the students.
- To teach kids responsibility—kids need to develop a sense of responsibility before they can be expected to care for a pet.

A pet will be a good addition to your classroom if:

- You want to share your love of animals with your students.
- You have specific learning objectives that will be better met by having an animal in the classroom rather than by other means (such as a field trip, video, guest presentation, or computer software).

It is recommended that parents be informed about the type of animal being considered. It is better to learn in advance what potential health problems your students may develop (like allergies or asthma) before acquiring the animal to avoid having to remove the pet from the classroom.

Who will care for the pet?

You will! You are the responsible adult. You can assign pet care duties to students, but you are ultimately responsible for monitoring and follow-up. Pet care duties should be used as a reward, not as a punishment.

What about vacation time? Again, the pet is your responsibility. If you don't take it home, you must make sure that the family who "adopts" it is both committed to and knowledgeable about caring for the animal. Make sure to determine in advance who is expected to pay for veterinary care during vacations when the pet is living with a student's family. Also, clarify who can make decisions should an emergency medical situation develop.

Be aware of the "honeymoon syndrome." Caring for the animal can be seen as a reward for the first month or two and may later be perceived as a chore. Make sure that pet care and the associated learning experiences are integrated in your curriculum on a continuing basis.



Who should be part of the decision-making?

Be sure to consult with your principal and your Animal Care Committee before bringing a pet into your classroom. The school should have the following established:

- A policy regarding classroom pets
- A plan to care for and manage the classroom animals
- A plan to respond to any parent's concerns
- A plan to deal with any student's injury or illness related to the presence of the animal in the classroom

Including your students in the decision-making process is a good way to develop a sense of "ownership" and responsibility toward the pet. As mentioned above, parents should also be made aware of the presence of the animal in the classroom.

Health Issues

Make sure you have a plan to deal with health issues and injuries before you introduce the pet into the classroom. Make sure that substitute teachers are made aware of this plan.

- Allergies: Be aware that some students may develop allergies to the pet or bedding materials.
- Injuries: Pets can bite, scratch, or peck when handled.
- Animals may carry infectious disease agents that are transmissible to people.
- People with certain illnesses or undergoing certain treatments may be immunosuppressed and therefore more prone to acquiring infections from animals as well as from people. Individuals at greater risk for infection include transplant patients, HIV+ individuals, patients with leukemia or other cancers, and patients being treated for asthma, lupus, and other diseases. If any of your students has health problems that could be aggravated by the presence of an animal, wait until next year to bring one into your classroom.

Other Considerations

- Make sure there is a quiet area in your classroom out of direct sunlight and drafts for the animal's living quarters.
- Make sure the temperature at night remains within an acceptable range.
- Establish a feeding and cleaning schedule, and keep records of who does what.
- Stress good hygiene. Students should wash their hands both before and after handling the animal. Children should not handle the pet when they have a cold or other illness.
- Do not breed animals in the classroom. Animal numbers can escalate quickly and cause problems due to overcrowding and stress from fighting, competition for food, chemical fumes, and bacterial contamination related to excess urine and feces. Finding good homes for the offspring is an almost impossible task.
- Animals will breed once puberty occurs, before they are fully grown. Although the animals may look young, they may be of breeding age. So if you will have more than one animal,

- don't mix the animals together in the same cage, even for short periods, until their sexes are identified. Have a knowledgeable person identify their sexes, and then keep males and females separated.
- Make sure you are ready to help your students deal with grief should the pet die or need to be euthanized.

Learning and Pets

Animals help students develop observation skills, empathy, and respect for living things. Classroom pets can be integrated into the curriculum in many ways. For example:

- Discussion about the species' country of origin can make a social studies unit more interesting.
- Water and food consumption can be measured and charted, and growth records maintained.
- Library research can reveal stories written about animals of this species.
- Students can write their own stories about the pet and use them as an inspiration for art projects.

Alternatives to Pets in the Classroom

It is not necessary to have a classroom pet to encourage students to learn about animals. Teachers might want to consider other options.

- Spend time with your class observing animals in the community and find out more about those species.
- Hang a bird feeder by the classroom window and identify its visitors.
- Invite local speakers to make presentations about their special interests.
- Have the class "adopt" a wild animal through a conservation group. Use conservation-related literature in classroom learning activities.

Resources

Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.



Animals in the Classroom: Allergy and Asthma Considerations

Allergies and Asthma

Housing animals in a classroom can increase the risk of allergic reactions in susceptible students. Allergies are a leading cause of chronic disease in children under age 17. Approximately 15–20% of school pupils suffer from varying degrees of allergy. Pre-existing allergic disease can lead to the development of sensitivity to animal allergens. Any animal species can be the source of allergic reactions. Allergic reactions can include skin welts and hives, itchy eyes, nasal congestion, sneezing, wheezing, and more serious attacks of asthma.

Sources of Allergens from Classroom Animals

The primary sources of allergens from classroom animals appear to be urine and saliva. Animal dander has also been identified as a potential source, particularly in guinea pigs. Children can be exposed by directly handling the animals or by airborne particles of dust from bedding that contains animal urine. Handling animals to pet or play with them, breathing near an open cage, and being present during cage cleaning activities increases the opportunity for exposure to allergens.

Notification of Presence of Animals in the Classroom

Parents and students should be alerted prior to acquiring a classroom animal and be warned about the potential for exposure to animal allergens. Parental awareness is particularly important for students with asthma. In some cases, parents may want to discuss the presence of classroom animals with their child's physician.

Below are some ways to minimize the concentration of allergens present in the classroom.

- Permit children to interact with animals only under adult supervision.
- Do not consume food or beverages in an area where animal contact is possible.
- Teach children to handle animals gently and carefully to prevent accidental exposure from bites and scratches.
- Avoid having children hold animals on their clothing, where hair, dander, and urine may be a source of contact.
- Have everyone wash their hands carefully after touching the animals or their cages.
- Keep animal cages clean to reduce the concentration of urine and feces in the bedding.
- Do not clean cages in a way that generates aerosols during times when the classroom is occupied.
- Keep animals in a well-ventilated area of the classroom, where room exhaust will draw dust and aerosols away from occupied classroom areas.



- Keep classroom humidity levels high to reduce dry air conditions that increase the allergic potential in dust and bedding, but still allow for the classroom to be comfortable for everyone.
- Make sure that housing animals in the classroom is in compliance with all applicable state, local, and school system regulations.
- Report and document any animal-related injuries or evidence of a student allergic reaction to the appropriate school personnel and parents.

Resources on the Web

1. American Academy of Pediatrics, describing common allergies and what triggers them. <http://www.aap.org/healthtopics/asthma.cfm>
2. American Academy of Allergy Asthma & Immunology, Back to School with Allergies and Asthma. http://www.aaaai.org/patients/just4kids/back_to_school/key.htm
3. National Association of State Public Health Veterinarians, offering guidance on preventing disease and injuries associated with animals in public settings. <http://www.nasphv.org/Documents/AnimalsInPublicSettings.pdf>

Establishing an Animal Care Committee

Classroom animals depend on people for their well-being. With proper research and planning, the experience can be both safe and rewarding for all involved. It is recommended that a school establish an Animal Care Committee (ACC) to oversee the acquisition and welfare of the animals housed at the school and the humane care of these animals, both on and off school premises. The role of the committee may be expanded to support the education of students and teachers on topics of animal welfare and stewardship. The ACC can function within one classroom or on a school-wide basis.

The ACC should be comprised of individuals from different backgrounds who can offer a variety of perspectives and expertise. Consider the following recommendations for committee membership: school faculty and staff, a local veterinarian, school nurse, teacher advisor, and most important, interested students familiar with the species being discussed. Ideally, the committee should meet early in the school year before the animals come to school.

The committee has a valuable role in helping students and teachers carefully think through the decision to bring an animal into the classroom and all aspects of care that will be required. By

asking key questions, teachers and students are encouraged to examine important issues that relate to the responsibility, care, and welfare of animals.

A strategy a school may find helpful for overseeing classroom animals is a Classroom Animal Plan. A school may consider adapting any of the following suggestions.

Students or faculty who would like to have a classroom animal would submit a written document, the Classroom Animal Plan, which addresses critical points of classroom animal welfare and serves as a practical guideline for the daily care and use of the animal. The ACC would review the proposed plan, perhaps at a convened meeting. In this review, information described in the plan would be discussed and verified, and questions may be raised on any information omitted.

Once the ACC approves the plan, the animal may be acquired. Then the ACC would have the responsibility of monitoring all plans in operation for appropriate care and use of the animals. Monitoring activities may include periodically visiting areas where animals are housed and observing husbandry and other animal activities. The ACC may request reports of animal activities



from individuals responsible for a Classroom Animal Plan.

The ACC may consider communicating summary information within the school community so that students observe the ongoing system of care for the animals and learn principles about animal welfare.

Writing the Classroom Animal Plan is ideally done as a class activity, giving students the opportunity to research, learn, and share their knowledge with others. Students on the ACC will have the experience of reviewing, verifying, and monitoring plans. At right is a suggested guideline for writing the Classroom Animal Plan.

Other Recommendations

The ACC can develop and maintain a catalogue of species-specific fact sheets and a weekly care log. The ACC can also collect samples of home care instructions, permission slips to provide weekend/holiday care, and other useful documents to establish a comprehensive animal care program.

Resources

1. The New Jersey Association for Biomedical Research (NJABR) hosts an educational site called Animals, Science and Know-how (ASK!), which offers training and resources to teachers who bring animals into the classroom to create a living, learning environment. For more information, visit <http://www.njabr.org/programs/ask>.
2. For information about the use of animals in research, visit www.kids4research.org.
3. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about a specific animal species.

CLASSROOM ANIMAL PLAN

1. Animal Species and number (what animal do you plan to keep, and how many?)
2. Nutrition
 - a. What is the appropriate diet?
 - b. How much food is required? How often?
 - c. Are there special vitamin or mineral needs for this animal?
 - d. Is fresh or live food required?
 - e. How will the food be stored?
3. Habitat
 - a. What kind and size of container/cage is needed?
 - b. Is there room for the animal to move around without hurting itself?
 - c. What is the environment for the animal? What is the ideal temperature? What is the ideal humidity? Is there adequate light or darkness?
 - d. Where in the room will you place this animal so that it will have constant temperature and humidity?
 - e. Will any enrichment be provided for the animal, such as toys, exercise wheel, or a tunnel?
4. Care
 - a. Who will pick up the animal and handle it?
 - b. What special things do handlers need to know about the animal? (For example, towels, gowns, or gloves may be needed for holding animals that have nails or urinate and defecate frequently.)
 - c. Does the animal bite or scratch? If yes, how will you prevent the handler(s) from being bitten or scratched?
 - d. How will students be trained to care for and handle the animal? Who will provide the training?
 - e. Animals don't like changes in their environment. How will you accustom your animal to the new surroundings, food, and water? How will you acclimatize your animal to make sure it is not frightened?
 - f. What will you use to clean the cage, food, and water dispensers? How will you rinse these items to make sure the animal is not exposed to the cleaning agent?
 - g. What kind of bottle or bowl will you use for water? Who will be responsible for giving the animal clean water and how often?
 - h. Who will take care of the animal on weekends and holidays? If going to a home, how will the animal be transported? What kind of container will be used? Can the animal escape? Write a plan describing what to do if the animal escapes at home or in school. If the animal does not go home on weekends or holidays, who is responsible for the animal's care during that time? Is the room temperature appropriate to leave the animal there when school is out?
 - i. If the animal needs veterinary care, which veterinarian will you use? Where will emergency contact information be posted?
 - j. If the animal dies, how will you dispose of the body? How will you address grief issues?

Caring for African Clawed Frogs (*Xenopus laevis*)

A wide variety of frog species are suitable for classroom use. These range from the arboreal and terrestrial American green tree frog, to the terrestrial Pacman (ornate horned) frog, to the semi-aquatic Northern leopard frog, to the fully aquatic dwarf frog and African clawed frog (*Xenopus laevis*). These frogs are long lived, with an average life span of 15 years; range in size from 1 to 6 inches; are carnivorous; and require different tank set-ups to reflect their natural habitats. These frogs generally have simple needs and *Xenopus laevis* is one of the easiest to care for.

Xenopus laevis is commonly known as the African clawed frog due to the presence of small black curved claws on the inner three toes of their hind feet. *Xenopus* is a hardy, tongueless, tailless, fully aquatic frog. It is especially suitable for the classroom due to its adaptability.

Xenopus is not a native species in North America. Some states (such as California) require a permit from the state's fish and game regulatory office for purchase of this animal. This frog should never be released into local ponds or rivers because it is extremely hardy and will compete with the native aquatic wildlife.

Housing Requirements

Xenopus is ectothermic—its body temperature is dependent on ambient temperature. As such, it requires warm, still water (66–77°F). *Xenopus*' normal behavior is to spend most of its time lying motionless below the surface of the water. However, it is important to be aware that the adults are lung breathers; some gas (particularly CO₂) is exchanged through the skin, but *Xenopus* must come up to the surface to breathe. These frogs can drown if they cannot get to the water's surface.

BIOLOGICAL INFORMATION

- Life span: 3-20 years in captivity
- Adult (2-3 years) snout to ventral length: female, 9-14 cm (3.5-5.5 in.); males, 7-9 cm (2.8-3.5 in.); males are much smaller than females).
- Sexual maturity: ~9 months; peaks at 2-3 years
- Young: Eggs are spawned and fertilized externally in the spring. Gilled tadpoles develop into lung-breathing, tailless, four-legged juveniles by ~10-12 weeks of age.
- Diet: Carnivorous. In its natural environment, it is a carrion eater, cannibal, and also eats small worms and insects.



Frogs are very sensitive to changes in water temperature. Sudden decreases or increases in water temperature by as little as five degrees could kill them. Be sure to provide adequate water; 1–2 liters (1–2 quarts) of water is needed per frog, and the water should be at least 12 inches deep (enough to completely cover the frog).

Xenopus prefers to be housed in small groups (2–3 frogs); keeping the frog numbers down will cut down on how often the tank needs to be cleaned. Water should be clean, potable, and treated to remove chlorine or chloramines; chemicals to remove chlorine or chloramines from tap water can be purchased from pet stores where fish are sold. Do not use distilled water. The water needs to be changed daily or at least every other day, about 2 hours after feeding.

A 12-hour light/dark cycle is recommended. Provide a hiding place for *Xenopus*, such as white PVC-like pipes or aquaria rocks that they can get under. Frogs will eat marbles and other small objects; do not put them in their aquaria. Opaque aquaria are optimal, but glass aquaria are acceptable if the frogs are provided with a place to hide. Tupperware or other large tubs designed to hold food intended for human consumption are also suitable.

Frogs can jump out of containers. Lids should have holes for air, but if frogs jump out of the water, they will dehydrate and die; make sure they cannot escape.



Feeding

Xenopus should be fed two to three times per week. Ideally, it is best to feed a complete and balanced diet in the form of a commercially prepared pellet designed for carnivorous fish or specifically for *Xenopus*. *Xenopus* will also eat small worms, crickets, grubs, small pieces of raw beef liver, or other organ meat.

Frogs feed in a frenzy. They swarm the food and devour it within minutes. Usually, two hours after feeding there is no food left in the tank; if there is, you are feeding them too much. If they are swallowing each others' arms and legs, they are too crowded and are hungry!

Xenopus can be seen eating their shedding skin. This is normal.

Handling

Xenopus has a slimy protective skin coating that keeps it healthy. Wear wet, waterproof gloves when handling the frogs so as not

to disturb this coating. Do not use powdered gloves. Handle frogs gently; *Xenopus* has very sensitive nerve endings along its body. Called the lateral line system, the nerve endings look like stitches along the side of the frog's body. Do not pour water directly on these frogs when filling tanks. It hurts!

Xenopus jumps forward and darts backward, requiring two hands to hold it in place. Unlike large toads and other frogs, they will not go limp and allow you to hold them with one hand around their middle.

Diseases

Xenopus is a generally hardy animal and does not often get sick. However, environmental disturbances, such as poor water quality, can lead to health problems. Signs of sickness include moving slowly, hanging out on the surface of the water, inability to dive, or staying at the bottom of the tank.

If you notice bloating, shedding of large amounts of skin, tufts of cottony or fuzzy white stuff growing on the skin, red spots, red streaks, or a swollen, reddened body appendage on one of your frogs, isolate the sick frog from the others and take it to the veterinarian immediately.

Human Health Concerns

Potentially harmful infectious agents may occur in the frogs' water, so wearing gloves protects people from contamination.

Some individuals are allergic to latex; parents should be alerted if latex gloves will be present in the classroom. You can also use non-latex gloves.

Seek the advice of a physician if a human disease is suspected due to contact with any species of frog.

Resources

1. Amphibians, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Caring for Gerbils

(*Meriones unguiculatus*)

Gerbils were first imported from the Mongolian desert into the United States in the 1950s. The upper part of the gerbil body is colored, ranging from pale yellow to black, but is generally brownish. The underside is white and the tip of the tail is bushy.

Gerbils have large adrenal glands, which is typical of water-conserving desert rodents, and a large abdominal marking gland, most prominent in the males.

Gerbils are very friendly. They are social animals and do not like being alone at all. It is best to have two gerbils of the same sex that come from the same litter.



BIOLOGICAL INFORMATION

- Life span: 2-5 years
- Adult body weight: 55-100 g (2-3.4 oz)
- Sexual maturity: 10-12 weeks
- Estrous cycle: 4-6 days
- Gestation: 24-26 days
- Litter size: 1-12 (average 3-7)
- Weaning age: 21-25 days
- Adult daily food intake: 7 g or 1/4 oz rodent pelleted diet
- Activity: very active, diurnal (active during the day)

Housing Requirements

Gerbils are generally housed in aquaria or similar types of containment, with wire mesh lids to provide air and prevent escape. The cage should be of a height that allows the animals to freely stand on their back legs and of a size that provides 36 square inches per adult. Gerbils require bedding to help keep a clean environment and to allow for their burrowing behavior. Bedding may be wood chips, wood shavings, pelleted cellulose, or similar materials at a level of approximately 2 inches or more in the cage. Pine and cedar chips should be avoided because of potentially toxic effects, especially on the young. The bedding should be changed weekly, and the cage should be cleaned at that time with detergent and water. The cage should be rinsed thoroughly and dried before replacing the bedding.

Gerbils are very active and should have environmental enrichment equipment, such as an exercise wheel, hollow tubes, or mazes.

As desert animals, gerbils are susceptible to the effects of high humidity. Consistently high humidity will cause them to have rough hair coats, sometimes with a greasy consistency. It may also be a predisposing factor for a more serious condition known as sore nose. It is best to keep gerbils in an environment of less than 50% humidity and a room temperature between 60–80°F (15.5–26.5°C). A small container of clean sand in the cage for sand bathing helps to maintain their hair coat and skin in good condition. The sand should be changed as often as the bedding.

Food and Water

In the wild, gerbils eat a wide variety of seeds, roots, fruits, cereals, and vegetables, as well as some insects. Providing gerbils with pelleted rodent food, available through pet stores, can satisfy their dietary needs, and the gnawing will help prevent incisor overgrowth. The diet should be a balanced ration and not limited to one food substance, such as sunflower seeds. Some ingredients in rodent feed, such as vitamins, lose their potency over time, so caution should be taken to store the food in dark, cool environments and never for longer than six months. Feed can be provided in a feeder or on the floor of the cage. The water supply should come from a bottle with a sipper tube, attached to the side of the cage. Adult daily water intake is about 4 ml (1/6 fl. oz).

Handling

Gerbils are gentle animals and generally do not bite, especially when handled regularly. Never pick a gerbil up by the tail alone; doing so can severely injure the tail. Gerbils may be picked up by the scruff of the neck while supporting the rest

of the body with the other hand. They will also walk freely onto the palm of an open hand.

The skin covering the tail is very delicate and may detach from the tail with even moderately rough handling. If this traumatic event occurs, seek the help of a veterinarian.

A significant percentage of gerbils have epileptic-like seizures as a reaction to loud noises, stress, or fright. This condition requires no treatment.

Diseases

Gerbils are not susceptible to many infectious diseases. The most common infectious disease found in gerbils is Tyzzer's disease, which affects the liver and intestinal tract. Infected animals may not show any symptoms except for weight loss, but sometimes diarrhea is present. Gerbils can also get intestinal parasites.

Sick animals generally have rough hair coats, decreased activity, and decreased appetite.

The most common condition affecting gerbils is facial eczema, also known as sore nose. The clinical signs of the disease are a moist dermatitis on the face, which generally causes the animals to scratch the affected area. The cause of the condition is complex and is related to increased excretions from Harderian glands in the eyes, sometimes in combination with a staphylococcal (staph) infection.

If an animal is noted to have any of the symptoms mentioned in this section, veterinary advice should be sought.

Human Health Concerns

Seek the advice of a physician if bite wounds or signs of allergies occur due to contact with gerbils.



Resources

1. Gerbils, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Caring for Guinea Pigs

(*Cavia porcellus*)

Guinea pigs have four digits on the foreleg, three digits on the hind leg, and a vestigial tail. There are three hair coat varieties: English shorthair, Peruvian long straight hair, and Abyssinian whorled hair. Their fur can be a wide range of colors, including white, brown, black, red, and various mixed colors. The young are born precocious, which means they are born fully mobile with hair, erupted teeth, and open eyes and ears. They start eating solid food at only a few days of age, but should be allowed to nurse until weaned by the mother. Guinea pigs have a large repertoire of vocalizations reflecting mood and emotion.

BIOLOGICAL INFORMATION

- Life span: 4-7 years
- Adult body weight: 700-1000 g (25-35 oz); females are slightly smaller than males
- Sexual maturity: females, 2-3 months; males, 3-4 months
- Estrous cycle: 16 days
- Gestation: 68 days (varies with size of litter, range 59-72 days); pups born with eyes and ears opened and fully furred.
- Litter size: 2-5
- Weaning age: 14-28 days
- Adult daily food intake: 35 g (1.3 oz)

Housing Requirements

Guinea pigs need substantial floor space to exercise. They do not jump or readily climb, so the height of the cage is less important. Guinea pigs should not be housed on bare wire grid or solid bottom floors because they are prone to developing sores on the feet. To avoid these problems, the cage floor should be covered with bedding (¼ inch to ½ inch deep). Guinea pigs play with their water and urinate copiously, so bedding is also useful for keeping the cage dry. Bedding material may include hardwood chips, wood shavings, paper products, corncob, or clean hay. Do not use cedar chips; wood bedding with a high content of resins, such as pine or cedar, may cause toxicity in the young if this material is eaten. Do not use bedding derived from clay (such as some kitty litters).

Depending upon the size of the cage and the type of bedding, the cage should be cleaned once or twice a week. It should never be allowed to remain moist, because that can lead to foot inflammation and infections. Cages should be washed with detergent and water. They should be thoroughly rinsed and dried before replacing bedding.

Room temperature should be in the range of 63–79°F (17–26°C) with 30–70% humidity.



Food and Water

In the wild, guinea pigs are strict herbivores, grazing on a wide variety of plants. In captivity, their nutritional needs are best met by providing them with commercially available guinea pig pelleted feed. Guinea pigs have teeth that grow throughout life, and pelleted feed helps prevent overgrowth. They are naturally coprophagic (eating their own feces), from which they derive nutritional benefit.

Guinea pigs are picky eaters. While young, they develop preferences for foods and food receptacles, and are resistant to changes in these items as they get older. For example, guinea pigs accustomed to drinking water from sipper tubes may not adjust easily to drinking water from bowls. If it is necessary to transition adult guinea pigs to new foods or feeding equipment, provide both old and new items simultaneously until the animals are using the new items reliably. After removing the old items, it is important to continue monitoring the animals to make sure each one is eating and drinking sufficient amounts.

Guinea pigs require a high level of vitamin C; thus, generic rodent foods may result in a clinical deficiency called scurvy (see Diseases, below). Because vitamin C and other nutrients deteriorate rapidly, the feed should be stored in a cool, dark place for a maximum of 90 days after the milling date (a date stamped on the bag). Some guinea pig foods (those with microencapsulated vitamin C) may have a 180-day shelf-life, so check the manufacturer's recommendations. Certain fruits and vegetables may be provided in small amounts and at frequent intervals, as a source of vitamin C and as treats. These foods should be rinsed well to prevent infection with *Salmonella*, which guinea pigs are particularly susceptible to. Vitamin C supplements may also be put in the water.

Guinea pigs have a tendency to overeat, which causes obesity and urinary tract problems. A veterinarian can advise you on the proper amount to provide daily.

Grass hay pellets (not straw or alfalfa) should be available to the animal ($\frac{1}{4}$ cup of pellets per 5 pounds of animal weight). Sunflower seeds should only be used as occasional treats; they are too high in fats and have little nutritional value.

Guinea pigs drink a large quantity of water. Consequently, water should be available at all times. Large-sized bottles with sipper tubes are commonly used. The bottles should be securely attached to the side of the cage. Because guinea pigs may play with their sipper tubes and flood their cage, position the sipper tube outside the cage to allow the animals to drink through a small opening in the cage wall. Water dripping from these sipper tubes will not drain into the cage interior. Guinea pigs may also plug the sipper tubes with chewed food retained in the mouth. It is important to check that sipper tubes are clear of debris to make sure water will flow freely for drinking. Water bottles and sipper tubes should be cleaned thoroughly whenever the water is changed (at least once a week).

Handling

Guinea pigs are gentle animals and seldom bite. However, they are high-strung and may either freeze or run when frightened. If you have more than one guinea pig and one animal is alarmed, other animals can detect the fright and become apprehensive. Approach a guinea pig quietly and confidently. It can be picked up by a gentle grasp around the chest while supporting the rear legs with the other hand.

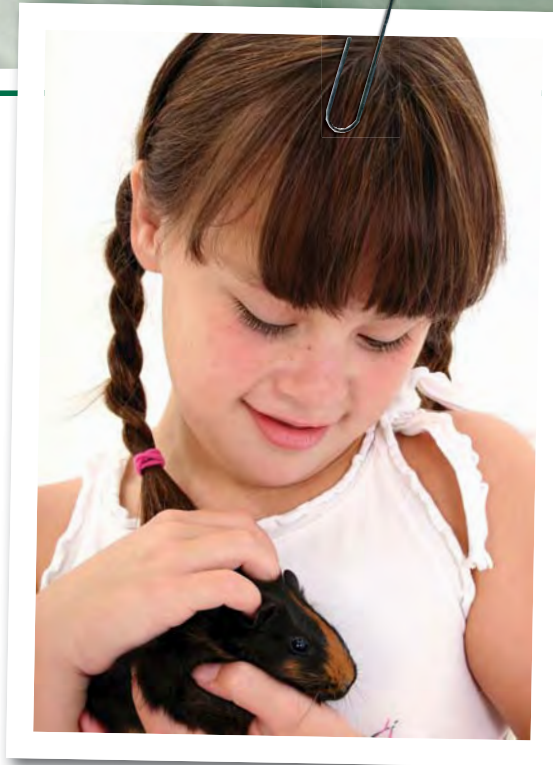
Breeding

Animals should not be bred in the classroom because of problems with overcrowding and sanitation. It is especially important not to breed guinea pigs because of dystocia (difficulty in giving birth), which occurs frequently in females bred for the first time at or above 6 months of age.

Diseases

Guinea pigs are susceptible to a wide range of bacterial, viral, fungal, and parasitic diseases. Most of these diseases are treatable but expensive. Before making the decision to acquire a guinea pig, consider whether or not you are willing to meet these potential expenses.

Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.



Sick guinea pigs tend to become less active, with ruffled hair coats and decreased consumption of food or water. If changes in bowel movements, urination, hair loss, discharges, or swellings are noted, a veterinarian should be consulted. A wide variety of antibiotics cause toxicity in guinea pigs, so caution should be taken when selecting them for treatment.

Guinea pigs are prone to respiratory infections, including pneumonia. Some infectious agents may also cause swelling of the lymph nodes and abscesses. Diarrhea may be caused by infectious agents, parasites, or protozoa. They are also susceptible to the development of bladder stones and bladder infections. Scurvy occurs within a few weeks of inadequate levels of vitamin C and may present

a wide variety of symptoms, including oral bleeding, swollen joints, infections, pneumonia, and diarrhea.

Pregnant females may develop toxemia, which is an emergency situation. In late pregnancy or after giving birth, affected females become depressed, anorexic, and generally have an unhealthy appearance. Death occurs rapidly if untreated.

Hair loss can be due to ringworm, parasitic lice or mites, or barbering—behaviorial chewing of hair by cage mates, typically males. Barbering is okay provided there are no fights or injuries.

Guinea pigs have permanently growing (erupting) teeth. If a guinea pig's teeth are misaligned (due to genetic predisposition), its cheek teeth may overgrow and jam the jaw open so that the animal will be unable to eat. If a guinea pig appears to be not eating or losing weight, it is important to have the guinea pig examined by a veterinarian. Overgrown teeth may be trimmed by a veterinarian.

Human Health Concerns

Some infectious diseases of guinea pigs, such as salmonellosis or ringworm, may be contagious to humans. People may also develop allergies to guinea pigs. Seek the advice of a physician if a human disease is suspected due to contact with guinea pigs.

Resources

1. Guinea Pigs, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Caring for Hamsters

(*Mesocricetus auratus*)

The Golden or Syrian hamster is the most common of the hamster species found as a pet. In the wild, they live in barren environments in Eastern Europe and the Middle East, usually in deep tunnels that provide cool temperatures and high humidity.

Hamsters are solitary animals and roam widely at night seeking food. They have cheek pouches that are used to store food during foraging. They also have pigmented flank glands that serve as marking glands, which are more prominent in males.

The most common color is reddish brown with a grayish white underside. Color variations include albino, cinnamon, piebald, and cream. They have short tails and very loose skin.

Hamsters will hibernate if exposed to prolonged periods of cold (below 5°C or 40°F). They are docile, males more so than females. Hamsters do not bite when they are used to being handled and if they are not startled or awakened suddenly.



BIOLOGICAL INFORMATION

- Life span: 1.5–2.5 years
- Adult body weight: 85–140 g (3–5 oz); females larger than males
- Sexual maturity: males, 6–8 weeks; females, 8–12 weeks
- Estrous cycle: 4 days
- Gestation: 16 days
- Litter size: 4–12
- Weaning age: 20–25 days
- Adult daily food intake: 10–15 g (1/3–1 oz)
- Activity: mostly sleep during the day and active at night (nocturnal)

Housing Requirements

Pet hamsters are usually housed singly since adults have a tendency to fight. A hamster requires a cage with bedding materials, such as hardwood chips, hardwood shavings, cellulose chips, or corncob pellets. Cedar and pine chips should not be used; they are abrasive, not absorbent, and potentially toxic. The bedding should be changed weekly, and the cage should be cleaned at that time with detergent and water. The cage should be rinsed thoroughly and dried before replacing the bedding.

The cages must have tight-fitting lids because hamsters are good escape artists. It is recommended that the cages provide at least 20 square inches of floor area per hamster and be at least 6 inches high.

Hamsters require exercise and should have items, such as an exercise wheel or tunneled trails made of plastic tubing, to provide environmental enrichment.

Room temperature should be in the range of 64–79°F (18–26°C) with 40–60% humidity.

Food and Water

Hamsters can be fed commercial pelleted rodent food to provide a balanced ration. Care should be taken to avoid feeding one type of seed, such as sunflower seeds, as a complete ration. These seeds are too high in oils and have a low nutritional value; however, supplemental fruits, vegetables, and seeds can be provided as a treat. Pelleted food should be stored in a cool, dark place for a maximum of six months.

Hamsters prefer to have their food on the floor of the cage and can be supplied fresh drinking water from a water bottle with a sipper tube. The food and water containers should be cleaned on the same schedule as the cage.

Handling

Hamsters are noted for their ability to deliver painful bites. This is especially true for strangers; hamsters tend to not bite persons they are familiar with. Some bites may require treatment by a physician. Most hamsters which have been handled from a

very young age will remain docile and rarely bite. Unless the hamster has been trained to walk into the palm of an open hand, it should be grasped quickly and firmly around the shoulders and sides of the neck. The loose skin on the back of the neck can also be grasped. Hamsters can also be moved by inducing them to walk into a transport container, like a small tin can.

Diseases

Hamsters are susceptible to a wide variety of bacterial, viral, fungal, and parasitic diseases. Sick animals tend to become inactive and develop a ruffled hair coat. Diarrhea is a common sign of disease. Hamsters are susceptible to a condition known as proliferative ileitis or wet tail, which has a high fatality rate, when they are young. Pneumonia is another common type of infectious disease. Hair loss and itching can be signs of parasites or ringworm. Hamsters may develop fatal reactions to many antibiotics; the advice of a veterinarian should be sought prior to treating a sick animal.

Human Health Concerns

Some diseases of hamsters can be contagious to humans. Rarely, pet hamsters may harbor the virus lymphocytic choriomeningitis virus (LCMV), which may infect people. Wild rodents are the primary carriers of this virus and could be a source to contaminate classroom rodents. Washing hands with soap and water after handling pet rodents is recommended. Seek the advice of a physician if a human disease is suspected due to contact with hamsters.

Resources

1. Hamsters, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.



Caring for Mice

(*Mus musculus*)

The mouse was first domesticated several hundred years ago by mouse fanciers who bred mutants with various colored hair coats. The albino laboratory mouse was derived from these mice in the early 1900s. Today, there is a wide variety of inbred and transgenic mice (mice carrying genes from another organism) that are prominent models for studying human diseases, such as diabetes, cancer, and muscular dystrophy.

Healthy mice should be alert and curious. The hair coat should be smooth and shiny.

BIOLOGICAL INFORMATION

- Life span: 2-2.5 years
- Adult body weight: 20-40 g (0.7-1.3 oz); newborn: 1-1.5 g (0.03-0.05 oz)
- Sexual maturity: 6-9 weeks
- Estrous cycle: 4-5 days
- Gestation: 19-21 days
- Litter size: 6-12
- Weaning age: 21 days
- Adult daily food intake: 5-10 g ($\frac{1}{5}$ - $\frac{1}{3}$ oz)
- Activity: nocturnal

Housing Requirements

Mice are best housed in cages with solid floors and walls that are either solid or wire mesh. Plastic cages made of materials such as polycarbonate are recommended because they allow for easy visualization and are resistant to chewing. However, other materials may be used if they meet these guidelines. Secure cages lids are necessary to prevent mice from escaping; lids are usually made of wire mesh and often contain slots for the placement of a water bottle and pelleted feed.

Bedding should be used in the cages to absorb urine and to allow the animals to modify their environment through burrowing and nest building. Useful bedding materials are wood shavings or chips, cellulose chips, and corncob pellets. Cedar chips or pine bedding should not be used; they are not absorbent and are very abrasive. Additionally, cedar oils are toxic and can cause respiratory and liver damage. Bedding should be changed several times a week and cages should be cleaned at least weekly with detergents and water, and then rinsed well and allowed to dry.



The cage environment for mice can be enhanced by using exercise wheels, plastic “igloos,” and hard plastic toys such as bones and tubes.

Mice should be kept in a room that has a stable temperature within a range of 68° to 76°F (20-25°C).

The light cycle for mice should be approximately 12 hours of light and 12 hours of dark. Mice are nocturnal and are most active at night. The retinas of albino mice are sensitive to bright light; over time, these mice may become blind if exposed to high light intensities. (Albino mice are recognized by their white fur and pink eyes.)

Food and Water

Commercial mouse feed provides a balanced diet that is specifically formulated for the nutritional needs of mice. It usually is manufactured in a pelleted form. Food should be available at all times. Feeding rodents sunflower or other seeds can lead to obesity due to high fat content and low nutritional value, and should be avoided. Young mice at weaning age can easily chew pelleted feed, so an intermediate form of diet is unnecessary. Pelleted feed can be presented in an elevated hopper or in a dish on the cage floor. Mice have incisor teeth that grow throughout life, and pelleted feed helps prevent overgrowth.

Mice are naturally coprophagic (eating their own feces); they derive nutritional benefit from this behavior.

Water should be available at all times. Water is best provided in a bottle with a sipper tube. If there are young mice in the cage, care must be given to ensure that the sipper tube and feed are within their reach. The water bottle must be well-stoppered so



Diseases

Mice are hardy animals, but they may become ill due to viral, bacterial, or parasitic infections. General signs of illness in mice are a hunched posture, decreased activity, weight loss, and a rough hair coat. Signs associated with respiratory infections include a nasal discharge, sniffing, and labored breathing. Infections of the intestinal tract are infrequent but can cause diarrhea. Mice infested with fur mites may have scratches or self-inflicted bite wounds.

Whenever possible, obtain mice from sources that have a known history of being disease-free.

Mice, like other animals and humans, may have diseases more common in old age, such as cancer and arthritis.

Mice housed in groups will commonly develop a hierarchy of dominance that may lead to fighting and barbering. Barbering is biting the fur off specific areas of the subordinate animal, often on the head or muzzle, giving the mouse a shaved appearance. Barbering is more likely to occur when males are group-housed. Barbering is okay, but the mice should be monitored for fighting and injuries. To help alleviate fighting and the wounds associated with biting, it is best to initially place only young mice together within a cage. Placing toys and other enrichment devices in the cage often eliminates barbering.

Human Health Concerns

Rarely, pet mice may harbor the virus lymphocytic choriomeningitis virus (LCMV), which can cause a flu-like illness in people. Wild rodents are the primary carriers of this virus; if they are able to gain entry into the school, they could be a source to contaminate classroom rodents. Washing hands with soap and water after handling pet rodents is recommended.

People may develop allergies to mice.

Seek the advice of a physician if a human disease is suspected due to contact with mice.

Resources

1. Mice, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

that water does not leak into the cage, potentially chilling animals or drowning them.

Handling

Mice will bite, so care must be taken to avoid being bitten. Prior to picking up a mouse, be careful to not startle it. Unlike with rats, stroking the back of a mouse is not helpful in calming the animal and may result in being bitten.

A mouse should be picked up by gently, grasping its tail near the base with one's thumb and forefinger and enclosing its body with a cupped hand. It is important to grasp the tail near the base to prevent breaking the tail. Also, do not dangle the mouse by the tail, which would frighten it. Instead, when you pick up a mouse this way, immediately cup it in your hand or transfer the animal to a solid surface.

Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Caring for Rabbits

(*Oryctolagus cuniculus*)

Rabbits are gregarious, generally mild-tempered, active, and curious. They are easily frightened and will often flee when threatened, although a rabbit may aggressively defend its territory, such as a cage, against handlers and other intruders. Their long incisors can deliver a painful bite. When a rabbit is not securely held, it may kick with its strong rear limbs and inflict painful scratches with the toenails.

The rabbit's entire skeleton represents only 8% of its total body weight, compared to 13% for the cat. This fragility makes the rabbit prone to bone fractures and spine injuries, and care must be taken to prevent the animal from being dropped or improperly picked up. Rabbits may even break their own spine when allowed to kick forcefully with their rear limbs, such as when they are not well restrained.

Injuries to people and rabbits are frequently due to the lack of knowledge and skill to properly handle, transport, and restrain a rabbit. Training to work effectively and humanely with these animals is essential for the safety of people and rabbits. Although rabbits do make excellent pets, they may not be a good classroom animal in the lower elementary grades.

Housing Requirements

Rabbits should be housed in roomy wire cages with at least some solid floor area, such as a plexiglass sheet or washable towels, to provide relief from the constant contact with the wire floor. Rabbits should never be allowed unsupervised freedom in a room because they love to chew and can injure themselves by biting electrical cords and other materials found in the classroom or the home.

Rabbits are adept at escaping from unsecured cages. If housed outside on the ground, the cage should have a secure flooring (such as wire mesh) or else the rabbits may quickly dig and tunnel out from the enclosure.

Cages must be cleaned often, at least once every 2 weeks. Rabbit urine contains large amounts of minerals; dried urine

forms deposits that can be removed with an acid solution before washing the cage. Vinegar is a good acid to use for removing these urine deposits. Rabbits shed a lot, and the hair should be removed often from the cage and the room where the animal is kept. Male rabbits may direct a stream of urine out of the cage through the wire mesh, which should be taken into consideration when determining the location of the cage.

Rabbit urine appears milky and varies from white to yellowish white to clear red. Red-colored urine may be mistaken for blood and can create an incorrect impression that the animal has bled inside its cage. Additionally, rabbits produce a special type of stool called "night feces" which is very soft and covered with thick mucus. The animal eats this stool to recycle proteins, water, and B vitamins. Because this stool is consumed overnight, this behavior is seldom seen by caretakers but if observed should not cause concern.

Rabbits are sensitive to high environmental temperatures; the optimal room temperature for rabbits is 61–72°F.

Rabbits typically become bored in a simple cage environment that lacks the opportunity for exercise, play, exploration, and interaction. Rabbits enjoy gnawing, so small dog chew toys such as a nylon bone may be given. Other safe toys designed for rabbits are available from laboratory animal suppliers. To allow rabbits some options in how they use their cage space, cages can incorporate nest boxes for hiding, raised areas for climbing, and sufficient space to stretch out in recumbence or to hop about. Claws will require clipping periodically to prevent them from being torn when caught in fabric or wire mesh. Claw clipping should be done by a veterinarian or a person who has been trained in this procedure.



BIOLOGICAL INFORMATION

- Life span: 5–8 years
- Body weight: adult, 2–6 kg (4.5–13 lbs); newborn, 30–80 g (1–3 oz)
- Sexual maturity: Females: 4–6 months
- Estrous cycle: No regular cycle; females usually receptive to breeding at 4–6 day intervals
- Gestation: 29–35 days
- Litter size: 4–10 kits
- Weaning age: 4–6 weeks
- Adult daily food intake: About 150 g (5 oz)

Food and Water

Rabbits are herbivores, and they feed by nibbling or gnawing their food. Adults 8 months and older should be fed commercial rabbit pelleted diets and only timothy hay; younger rabbits may eat alfalfa or oat hay. Rabbits sometimes tend to overeat and gain excess weight, in which case they may need to be fed only measured amounts of food. Other food items (lettuce, spinach, carrots, and apples) can be offered in small amounts. A veterinarian can provide advice on feeding.

Fresh water should always be available either in a bottle with a sipper tube or in a heavy ceramic dish that cannot be overturned. Water containers should be cleaned daily.

Handling

The improper handling of rabbits can cause serious injuries. When frightened and trying to escape, rabbits tend to kick their hind legs, which can injure their backs and result in paralysis of the rear legs. If a rabbit resists being picked up, it should be released immediately and approached later after it has calmed down.

Rabbits should never be picked up by their ears. To pick up a large rabbit, put one hand under the chest and the other hand under the animal's rear quarters. In general, rabbits don't like to be held and prefer to be petted while sitting next to, rather than on, the person doing the petting.

Diseases

Rabbits can develop health problems that can be quite expensive to treat. Make sure you are prepared to face these expenses before you choose a rabbit as a classroom pet.

Rabbits may develop overgrown incisor teeth that interfere with the animal's ability to eat. Overgrown incisors must be clipped by a veterinarian or a person who has been trained in this procedure.

Rabbits can suffer from heat stroke. Signs of heat stroke include panting, salivation, ear reddening, weakness, refusal to move, and convulsions. If heat stroke is suspected, the rabbit should be sprayed or gently bathed with cool (not cold) water. Consult a veterinarian immediately.

Rabbits frequently develop hairballs in the stomach; hair enters the stomach when the rabbit grooms its fur, and the fur remains in the stomach because it does not pass through into the feces. Rabbits are not able to vomit, so hairball problems can be suspected when the rabbit loses its appetite and becomes thin and



listless. Surgery may be necessary to remove the hairball, although oral administration of enzymes and other medications may help dissolve the hairball and resolve the problem. A veterinarian should be consulted.

Rabbits, especially adults, may develop sores (including skin ulcers) on the rear paws when housed on wire floors. This condition should be treated by a veterinarian.

Snuffles is a common upper respiratory tract disease that, if left untreated, can become chronic or fatal. The bacterium *Pasteurella multocida*, which often lives in rabbit noses, is the most common cause of the disease. Signs of infection do not usually occur until the animal is stressed or has a suppressed immune system. The disease is highly contagious and can be transmitted not only by rabbits but by human handlers, so always wash your hands after handling a rabbit. Even healthy-looking rabbits without any sign of the disease can develop snuffles. Initial symptoms include a nasal discharge, sneezing, and loud snuffling or snorting due to the blocked nasal tract. Progressive signs of the disease include conjunctivitis, an eye infection, ear infections that cause torticollis (twisting of the neck), head shaking, scratching, head tilt, disorientation, circling, or an inability to stand. The infection can clear up in one part of the body but remain in the rest. An advanced case of the disease includes pneumonia and bacteremia, a blood infection. Rabbits showing any of these symptoms should be seen by a veterinarian as soon as possible. Treatment can be long term and includes the use of antibiotics. The risk for snuffles can be minimized by protecting the rabbit from stress; you can do this by providing comfortable, entertaining housing, and good nutrition for your rabbit.

Human Health Concerns

Humans may be infected by the *Pasteurella multocida* agent that causes snuffles in rabbits. Infectious disease risks from pet rabbits are generally low, although wild rabbits may harbor disease agents that can infect humans. Rabbit bites and scratches may be severe. People may develop allergies to rabbits.

Seek the advice of a physician if a human disease is suspected due to contact with rabbits.

Resources

1. Rabbits, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Caring for Rats

(*Rattus norvegicus*)

The species of rat available today in pet shops and used in biomedical research is *Rattus norvegicus*. Prior to use in research or as pets, rats were bred for use as prey for gaming purposes in the 1800s. From this early domestication, albinos and various-colored mutants were selected by individuals. The albino rat is the predominant rat used in research today. An albino animal is recognizable by its white fur and pink eyes. However, there are a variety of non-albino rats sold in pet shops that have varied hair coats, such as white with black or tan coloration over their shoulders and chest (hooded rats) and solid-colored animals that may be blond, tan, or black.

Rats are nocturnal, so they eat and reproduce at night and sleep or rest during the day. Rats are social animals and usually will not fight when group housed in cages. They groom and play together and tend to sleep close to each other.

Housing Requirements

Rats are best housed in cages with solid floors and walls. Plastic cages made of materials such as polycarbonate allow easy visualization and prevent damage by chewing, although other materials may be used if they meet these guidelines. Secure cage lids are necessary to prevent rats from escaping; lids are usually made of wire mesh and often contain slots for placement of a water bottle and pelleted feed holders.

The desired temperature is 65–80°F and humidity is 30–70%.

Bedding should be used within cages to absorb urine and to allow the animal a means to modify its environment. Useful bedding materials are wood shavings or chips, cellulose chips, and corncob pellets. Cedar and pine shavings contain potentially toxic resins and should be avoided.

Bedding should be changed several times a week. Cages, water bottles, and feed containers should be cleaned at least weekly with detergents and water, and then rinsed well and dried. Vinegar can be used to remove scale, a residue from rat urine.

The cage environment for rats may be enhanced by the introduction of hard plastic or metal toys, such as balls, bones, and tubes, that are resistant to chewing. Cardboard nesting boxes can also be used.

Food and Water

Commercial rat feed provides a balanced diet that is specifically formulated for the nutritional needs of rats, and it usually is manufactured in a pelleted form. Food should be available at all times in an elevated hopper or in a dish on the cage floor. Young rats at weaning age can easily chew pelleted feed; an

intermediate form of diet between nursing and regular feed is unnecessary. Oil-rich sunflower seeds may be given occasionally as a treat, but very sparingly. Obesity is a common problem with rats and is worsened by oil-rich and high-fat diets or treats. Rats have incisor teeth that grow throughout life, and pelleted feed helps prevent overgrowth. Rats are naturally coprophagic (they eat their own feces), and derive a nutritional benefit from this practice.

Water should be available at all times. Water is best provided in a bottle with a sipper tube. Sipper tubes should be checked daily to make sure they are not clogged. If there are young rats in the cage, care must be given to ensure that water and feed are within reach of the animals. The water bottle must be well-stoppered so that water does not leak into the cage, potentially chilling the animals.

BIOLOGICAL INFORMATION

- Life span: 2-3 years
- Adult body weight: males: 400-600 g (14-21 oz); females: 250-300 grams (9-11oz)
- Sexual maturity: 7-8 weeks
- Estrous cycle: 4-5 days
- Gestation: 20-22 days
- Litter size: 6-12
- Weaning age: 21-25 days
- Adult daily food intake: 15-30 g (1/2-1 oz)



Handling

Rats will bite; however, frequent and gentle handling or stroking will greatly reduce the likelihood of being bitten. It is thought that male rats are more likely to bite than females. As with most animals, rats respond well to being approached in a manner that does not cause startling and anxiety. A rat well-conditioned to gentle handling will rarely bite.

The best method for picking up rats is to gently but firmly grasp the rat around the chest with the thumb and forefinger of one hand, being careful to not compress the chest wall. The forefinger should be behind the elbows of the rat to help ensure that the rat is not accidentally choked. An alternative way to pick up rats is to grasp the rat at the base of the tail (not at or near the end of the tail). Picking up a rat by grasping the tip of the tail will usually cause the skin to separate from the bone. Another way to pick up a rat is to grasp the scruff of the back, lift the animal, and then transfer it to a solid surface. Females should not be disturbed for 2–3 days before and 2–3 days after they have given birth to avoid cannibalism.

Diseases

Rats are hardy animals, but they may become ill due to viral, bacterial, or parasitic infections. Whenever possible, obtain rats from sources with a known history of having disease-free animals. It is a good idea to visually check the animals daily to look for signs of sickness, such as rough coat, dull eyes, hunched appearance, sitting back, and decreased activity.

At least weekly, physically handle the rats to feel for unusual bumps (rats are prone to developing tumors), kinks, scabs (which can mean mites), cloudy eyes, or other problems.

Many of the infectious diseases of rats affect the respiratory tract, causing rhinitis and pneumonia. Symptoms associated with respiratory infections include a nasal discharge, sniffing, and labored breathing. Infections of the intestinal tract are infrequent but can cause diarrhea.

Rats have large incisor teeth that continuously grow throughout their lives. If rats are fed soft food, have a broken incisor, or a genetic malocclusion (misaligned teeth), the teeth will not



wear down properly. If this occurs, the incisor teeth continue to grow and curl until the animal can no longer effectively chew food. Consult a veterinarian who can trim the teeth.

Human Health Concerns

Although very infrequently seen, rats can harbor two bacterial species that cause a human disease called rat bite fever. As the name indicates, the disease is transmitted to humans by rat bite. This is one reason to know the disease status of any rats obtained for use in the classroom or as pets.

Rarely, pet rats may harbor the virus lymphocytic choriomeningitis virus (LCMV), which may infect people. Wild rodents are the primary carriers of this virus, and could contaminate classroom rodents. Washing hands with soap and water after handling pet rodents is recommended.

People may develop an allergy to rats.

Seek the advice of a physician if a human disease is suspected due to contact with rats.

Resources

1. Rats, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Caring for Snakes

Several types of snakes are commonly kept as educational classroom animals, including garter snakes, rat and corn snakes, ball pythons, and king snakes. Because many of these species are native to North America, state permits may be required to possess them. Boas and pythons (other than ball pythons), while small when young, can grow to be quite large and may be difficult and dangerous to handle in the classroom.

Some snake species are venomous and should never be kept as pets or in the classroom. Always consult with state and federal wildlife agencies before acquiring any snake species. It is best to obtain snakes from captive-bred sources rather than deplete them from the wild by keeping wild-caught animals.

Housing Requirements

Snakes can be housed in glass or plexiglass aquaria, plastic sweater boxes, or specially constructed reptile cages. Cages must be impervious to water and cleaning agents so they can be effectively disinfected. For many species, cages should be cleaned every two weeks. Garter snake cages usually require weekly cleaning. A dilute bleach solution (1 part bleach to 30 parts water) is generally effective, but care must be taken to remove all disinfectant residues during rinsing. Do not use phenolic compounds like Lysol® anywhere around snakes—these chemicals are very toxic to them.

Cages must have a tight-fitting, secure lid with a soft screen or holes to allow adequate air exchange. Most snakes, including king, corn, and rat snakes, are escape artists and can push open loose-fitting lids and squeeze through very small openings.

The cage bottom can be lined with paper, indoor/outdoor carpet, or shredded hardwood bedding. Paper is inexpensive, but some inks may run when wet. Indoor/outdoor carpet provides traction for crawling, and can be disinfected and re-used. Shredded hardwood bedding is absorbent, attractive, and easy to clean and replace. Bedding permits the snake to burrow (a normal behavior). Aromatic shavings, such as pine and cedar, can be toxic to snakes and should not be used.

A water bowl large enough for the snake to crawl into should be provided. Bowls should be easy to disinfect and heavy enough to prevent tipping. Snakes may spend a significant amount of time soaking, particularly before shedding; therefore, it is important to change water bowls every one to two days to avoid fecal contamination and bacterial buildup.

Snakes are shy by nature and must be able to periodically hide from view. Pieces of terra cotta flower pots, sections of tree bark, “caves” made of flat rocks, and commercially produced “hide boxes” work well as retreats and also provide a raised surface to bask on.



BIOLOGICAL INFORMATION

- Snake skin is smooth, dry, and covered with scales. The skin is periodically shed in a single sheet, including the scales that cover and protect the eyes (spectacles). Several days before shedding, the skin and especially the eyes become cloudy and opaque. Snakes do not have eyelids or external ear openings.
- The snake tongue is forked and is part of an accessory olfactory system. As the snake flicks its tongue, it picks up scent molecules and transports them to a special organ in the roof of the mouth. A snake flicking its tongue is actually “tasting” its environment, which is a normal exploratory behavior.
- The glottis or respiratory tract opening is located on the floor of the mouth behind the sheath that holds the retractable tongue (see Resource 3). This configuration allows snakes to hold and swallow very large prey items without compromising or blocking respiration.
- Snakes are totally carnivorous, and they swallow their prey whole. Teeth are not used for chewing; rather, they are used to “walk” the food item down the esophagus. Snakes are also able to move each side of their lower jaw independently, thereby enabling them to swallow prey items larger than their own head. Some species, such as king snakes, will eat other snakes as part of their normal diet.
- Snakes are solitary by nature and do well when housed alone. However, some snakes can be pair- or group-housed, as long as they are the same size and not cannibalistic. Regardless of species, snakes must be separated during and immediately after feeding to prevent inadvertent ingestion of cage mates.
- Many snake species lay eggs; however, some species bear live young. Examples of live bearers include garter snakes, water snakes, and boa constrictors. If a snake lays eggs, they can be removed and incubated in warm, humid sphagnum moss. Unlike bird eggs, reptile eggs must not be rotated during incubation.

Snakes are ectotherms; they rely on the external environment to control their body temperature. Most snakes need warm ambient temperatures (approximately 75–85°F) and do best if provided a thermal gradient within the cage. A low-wattage light bulb placed outside the cage and focused on the basking surface will create a thermal gradient. Temperature should be monitored throughout the cage to ensure that the animal's environment does not become too hot or cold—either extreme can have fatal consequences. Snakes must also be prevented from coming into direct contact with any heat source, or thermal burns will result.

Food and Water

Many species of snakes, including king, rat, and corn snakes, will eat mice. Larger snakes may prefer rats. Most snakes will accept pre-killed prey; therefore, it is not necessary to feed live rodents. In fact, live rodents can gnaw on snakes and inflict severe wounds. Frozen prey must be thawed and warmed to room temperature or higher prior to feeding; cold food will putrefy rather than be digested in the snake's stomach.

Most adult king, rat, and corn snakes will eat once every 1–2 weeks, but may need feeding more often. The feeding schedule must be adjusted to the species, the age and size of the snake, and the type of food offered. Garter snakes eat fish, frogs, and earthworms, and are generally fed at least weekly. Young snakes may require more frequent feeding than adults, usually once or twice a week. Hungry snakes are normally more active than well-fed snakes.

Many reptile illnesses are caused by an improper diet. Please consult a veterinarian for advice. It is suggested that you contact your nearest zoo or a herpetology society to obtain the name of veterinarian knowledgeable about the care of reptiles. Not all veterinarians have experience in this area.

Handling

Snakes should always be approached and handled in a calm, deliberate, gentle manner. The snake's entire body must be supported during handling. If the body is not fully supported, the snake will probably experience minor to extreme discomfort and will become agitated. Snakes can usually be restrained by gripping them with moderate pressure while allowing them to crawl through a tube that works as a restraint device. Restraining snakes with a tight grip behind the head should be avoided unless absolutely necessary because such restraint can cause significant trauma to the snake and will certainly induce a flight-or-fight reaction. Any sort of handling will frighten most snakes and cause them to deliver defensive bites. Such snakes generally let go immediately, but may bite repeatedly. Hungry snakes often mistake a handler for food items. In this situation, bites are usually held much longer and may result in attempts at feeding.

Diseases

Animals caught from the wild can have viral, bacterial, and parasitic diseases. Improper feeding, sanitation, temperature, and other



stressors will predispose snakes to the development of disease. Signs of illness in snakes include mouth breathing, vomiting, diarrhea, not eating, and weight loss. If any of these signs are seen, a veterinarian should be contacted immediately. As mentioned above, a good place to go to identify a veterinarian who treats reptiles is to contact a zoo or the herpetology society in your area.

Human Health Concerns

Snakes and other reptiles can carry *Salmonella*, a bacterium which can cause significant gastrointestinal disease in humans. Good hygiene should be practiced whenever handling the animal. Wearing gloves while handling snakes and washing hands thoroughly after handling them will help protect you against this disease. Eating and drinking should also be avoided when anyone is around the animals. Proper hygiene during normal cage maintenance should also minimize potential exposure to *Salmonella*.

Nonpoisonous snakes can bite and cause an injury. Seek the advice of a physician in cases of a snake bite or if a human disease is suspected due to contact with snakes.

Resources

Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Caring for Turtles

Turtles (chelonians) are reptiles that can be found in a variety of habitats, including oceans, ponds, swamps, grasslands, and deserts. Turtles are sometimes classified as turtles (water dwelling), tortoises (land dwelling), or terrapins (land and water dwelling). For this article, all chelonians will be referred to as “turtles.”

Some turtle species grow quite large and require extensive enclosures or ponds. Others, such as box turtles and painted turtles, can be housed successfully indoors in a classroom setting.

State and federal wildlife agencies should always be consulted prior to obtaining a turtle, as many native species are protected. It is preferable to obtain turtles from a captive-bred source rather than keeping wild-caught animals.

Housing Requirements

Box turtles, painted turtles, and related species can be individually or group housed, provided there is ample food and uncrowded conditions.

Box turtles are terrestrial and can be housed in large open cages or large aquaria. Paper, hardwood shavings, or another appropriate substrate should be provided. Aromatic shavings, such as cedar and pine, should not be used. A large, shallow water bowl is required for crawling into for drinking and soaking. Fresh water should be provided daily.

Painted turtles and sliders require an aquarium of appropriate size with water for swimming. Substrate is not necessary; however, if a substrate like aquarium gravel is used, it should be large enough to prevent ingestion.

Cages and aquaria should be made of a substance easy to disinfect, such as glass or plexiglass. Lids are generally not required; however, the sides should be of sufficient height to prevent climbing out.

Housing should be cleaned with a dilute bleach solution (1 part bleach to 20 parts water) and rinsed thoroughly to remove all chemical residue. Do not use phenolic compounds like Lysol® anywhere around turtles—these are very toxic. The cleaning frequency depends on the species and number of animals housed. Aquaria with static (unfiltered) water should be emptied and cleaned weekly or more frequently, as determined by the buildup of uneaten food and feces. Similarly, cages for box turtles should be cleaned at least once weekly.

All turtles should have access to shelters that allow them to retreat and escape from view. “Hide boxes” work for box turtles; aquatic species can be provided with plastic aquarium vegetation or submerged objects behind which they can hide.

Turtles generally do well with an ambient temperature of 75–85°F, with a warmer basking spot. Painted turtles and



BIOLOGICAL INFORMATION

- Turtles are ectotherms; they rely on the external environment to control their body temperature.
- Turtle skin is covered with small scales. Most turtles also have large scales, called scutes, which cover their bony shells.
- The shell is fused with the ribs. In some species, such as box turtles, the bottom part of the shell has a hinge which closes tightly to protect the head and forelegs.
- Turtles have eyelids, and their external ear openings are covered by skin.
- Turtles lack teeth; they have a horny beak which is used for grasping and tearing food.
- All turtles lay eggs. Many require soil or another substrate (material needed to complete the task) to dig a nest. Eggs can be artificially incubated in warm, moist sphagnum moss or vermiculite. Care should be taken not to disturb the orientation of the eggs during incubation.



ed turtles will eat Repto-Min, whole minnows, aquatic vegetation, earthworms, and floating fish food (such as trout chow). Feeding frequency ranges from daily (young animals) to several times a week (adult animals).

Handling

Box turtles can be easily picked up by the sides of the shell. They rarely bite, but may scratch in an attempt to get away. Young painted turtles and sliders can be handled the same as box turtles; older animals (particularly sliders) may bite if they feel threatened. When restraining any turtle, support it firmly but carefully; dropping an animal can result in a shell fracture or other trauma. Always wear gloves or wash hands thoroughly after handling turtles, their cages and tanks, or anything associated with them. *Salmonella* may be carried by turtles, particularly young animals; avoid eating or drinking anywhere near the cage or tank.

sliders require a dry surface on which to crawl out of the water and bask. Box turtles likewise should have a basking area within the cage.

A low-wattage light bulb focused on the basking site will provide a warm spot and temperature gradient, allowing the animal to engage in behavioral thermoregulation. Young box turtles, painted turtles, and sliders require a full-spectrum light source for proper Vitamin D metabolism. The lights can be purchased at pet stores or through online vendors. The light source should be 18–24 inches above the turtle cage or tank; glass and plastic absorb the needed wavelengths. Care must be taken to prevent the animal from contacting the heat source, and from allowing the cage temperature to get too high. The lack of an appropriate light source, particularly if combined with improper diet, will result in a Vitamin D and calcium deficiency (soft shell).

Food and Water

Diet depends upon the species. In their natural habitat, box turtles are omnivorous and eat worms, other prey items, vegetation, fruit, and berries. Painted turtles, sliders, and their relatives are also omnivorous, with aquatic vegetation, minnows, and aquatic invertebrates making up the bulk of their diet.

In captivity, box turtles will eat canned dog food, earthworms, fresh fruit, vegetables, berries, and high-quality reptile diet such as Repto-Min (soak the Repto-Min in water first). Sliders and paint-

Diseases

Lack of adequate temperature, nutrition, and full-spectrum light, or dirty, crowded housing will cause disease, especially in young animals. Older (adult) turtles are generally easier to keep and less likely to spread *Salmonella*. Signs of illness in turtles include open-mouthed breathing, swollen eyes, nasal discharge, blowing bubbles from the mouth or nose, soft shell, reluctance to move, not eating, and diarrhea. If any of these signs are seen, a veterinarian should be contacted immediately.

Human Health Concerns

Some infectious diseases of turtles, such as salmonellosis, may be contagious to humans. Seek the advice of a physician if a human disease is suspected due to contact with turtles.

Resources

1. Less Common Research Animals, chapter in *Assistant Laboratory Animal Technician Training Manual*, 2008, American Association for Laboratory Animal Science, Memphis, TN.
2. Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about this animal species.

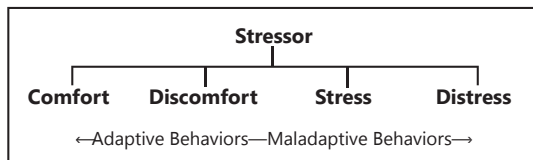
Some of this material has been adapted from the Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Signs of Pain and Distress in Classroom Animals

Pain can be defined as an unpleasant sensory or emotional experience that may or may not be associated with tissue damage. One can reasonably assume that what is painful to humans will also be painful to animals. It is generally recognized that all animals, including invertebrates, can feel pain. Pain can have a protective role in that it tends to cause the animal to change its behavior to protect the affected area from further damage and to reduce or avoid recurrence of the painful sensation. Individual responses to pain vary among animals as they do with humans, and can also be species-specific.

Distress is more difficult to define. A guideline from the Institute for Laboratory Animal Research defines distress as stress to which the animals cannot adequately adapt. Distress may be induced by psychological, physiological, or environmental factors. Collectively, these factors are known as stressors. Possible causes of distress include inadequate housing arrangements, over- or under-stimulation, inadequate temperature and humidity conditions, and, of course, pain.

Pain and distress can be thought of in terms of a continuum of emotional and experiential states that may occur in an animal. On the left of the figure below, Comfort represents a state of well-being, where the animal is contented and comfortable. Stressors acting upon the animal in increasing severity cause the animal to progressively become uncomfortable (Discomfort), then stressed (Stress), and finally distressed (Distress). Distress represents the extreme point in this continuum, on the far right. Stressors acting upon the animal may move the animal's experience along this continuum between the extremes of well-being and distress. Depending on the nature and severity of a stressor and on the animal's current state of being, the animal may adapt successfully to a stress (Adaptive Behaviors) or it may become distressed in a way that threatens its well-being or health (Maladaptive Behaviors). Maladaptive behaviors include abnormal feeding, absence or diminution of grooming, and changes in social interaction (aggression, withdrawal).



Teaching young children to interact with animals in a responsible and kind way and providing adequate supervision will help avoid exposing the animals to unnecessary stress. If pain or distress is suspected, the responsible adult should seek veterinary care immediately.

Recognizing Pain and Distress

A departure from an animal's normal behavior is an important indicator that it is undergoing pain and distress. This is why it is so important to be aware of an animal's normal behavior, both as

a species and individually. Responses to stress differ widely within and among species, and oftentimes signs of pain and distress are subtle and can be difficult to detect. Some of the more easily recognizable signs are listed below. For species-specific signs of pain and distress, please see the individual sheets in this booklet.

- Changes in temperament or attitude; a friendly, docile animal becomes aggressive or unresponsive
- Restlessness; pacing, changing position frequently
- Decreased activity; reluctance to move, does not respond normally when approached
- Isolation; stays in the corner of the cage, does not interact with cage mates
- Change in posture; hunching, huddling, crouching, stiff movement, head down
- Protecting a part of the body; growls or attempts to bite when that body part is approached or touched
- Abnormal vocalization, especially when a painful area is touched; whimpering, hissing, squealing, squeaking
- Change in appetite and water consumption leading to weight loss and dehydration (in small rodents, dehydration causes rapid weight loss)
- Self-mutilation, excessive licking of the area, biting, scratching
- Changes in hair coat appearance; decreased grooming leading to rough-looking coat, greasy appearance, piloerection (hair erect), loss of hair (baldness, hair shafts broken)
- Changes in facial expression; sleepy appearance, avoidance of light
- Discharge from eyes (tears, pus, blood) or nose (runny)
- Changes in bowel movement or urination; diarrhea with soiling around the anus, or lack of bowel movements (constipation)
- Sores, reddened areas on the skin, open wounds
- Increased body temperature
- Changes in respiration rate or character; rapid, shallow breathing



Resources

1. "Signs of Disease in Classroom Animals," part of the "Caring for Animals" series. <http://www.kids4research.org>.
2. Guidelines for the Recognition & Assessment of Animal Pain: http://www.vet.ed.ac.uk/animalpain/Pages/table_of_contents.htm

Contact your veterinarian or a local veterinary school or veterinary technology program to get more information about an animal species.

Some of this material has been adapted from Recognition and Alleviation of Distress in Laboratory Animals by the Committee on Recognition and Alleviation of Distress in Laboratory Animals, National Research Council, 2008 http://books.nap.edu/catalog.php?record_id=11931

Signs of Common Diseases in Classroom Animals

An animal cannot complain when it does not feel well; therefore, one must learn to look for signs of illness. There are many possible signs of illness, and these differ widely among species and even among individuals.

Whenever possible, obtain animals from sources with a known history of having disease-free animals. It is important to be knowledgeable about the normal appearance and behavior of the species of animal, since a change in these characteristics is key to recognizing that an animal is ill. Animals should be observed daily by responsible individuals who should be aware of and note subtle changes that could be easily missed in the animal's behavior, physical appearance, or daily activity.

The signs of disease, pain, and distress are often similar in animals. If an animal has a changed appearance or behavior, then consider the possibility that the animal may either have a disease or be in pain or distress. It is important that such an animal be examined and treated by a veterinarian. If the animal is to receive treatment in the classroom, under the direction of a veterinarian, then a teacher should oversee medical administrations and make daily observations of the animal.

The conditions described below are potential indicators of disease in animals. Signs of disease, pain, and distress may overlap, and these conditions are also reviewed in the AALAS fact sheet "Signs of Pain and Distress in Rodents and Other Classroom Animals."

Alopecia (hair loss): Usually associated with a skin disease, fighting, parasites, or over-grooming. An individual animal may groom a body part excessively if there is pain or abnormal sensation. When multiple animals are caged together, a dominant animal may chew off patches of hair; this is another form of over-grooming common in mice and guinea pigs.

Anemia: Normally pink areas of skin and mucous membranes (gums, tissues around the eyeball) are pale. Gums that normally are pink may appear almost white in an anemic animal. This is usually associated with excess internal or external blood loss or reduced numbers of circulating erythrocytes (red blood cells). Anemia may indicate some types of parasitism.

Anorexia: The animal is not eating. An animal that is ill or in pain may decrease its food intake. Anorexia is often noted when animals are not drinking due to an empty bowl or bottle or to an inaccessible, broken, or disconnected source of water. It is extremely important to always check to be sure an animal can get enough clean water.

Behavioral change: This is often the only indication that something is wrong with the animal. An animal that suddenly becomes aggressive, quiet, or loses interest in its surroundings is often sick or in pain or distress.



Bleeding: Blood can be lost externally, such as from a torn nail, a bite wound, or a cut on the mouth or skin. Blood can also be lost internally, such as from the urinary bladder, the bowel, or the uterus. You may see fresh blood in the cage but not on the animal, or you may see blood in the urine. Blood in the feces may be red, if passed near the end of the gastrointestinal tract, or it may be black and tarry, if digested.

Bloating: Swelling or filling with gas, typically in the gastrointestinal tract (stomach, intestines). This is most common in dogs, ruminants (e.g., cattle, sheep, goats), and horses.

Circling or head tilt: An abnormal behavior where an animal walks in a circle (usually in one direction) or tends to hold its head to one side. This often indicates an infection of the middle or inner ear or a brain lesion. Circling and head tilt may be recognized in affected rodents when held gently by the tail; these animals will attempt to spin in a circle.

Constipation: There are no feces being passed. This can be caused by a lack of feed or water, infections, and a number of other disease problems.

Diarrhea: The passage of watery or loosely formed feces. Often the animal will have feces staining its perineum or tail region. Infections of the bowel or parasites of the intestinal tract can cause diarrhea.

Discharge: The secretion of a wet material from a body opening such as the nose, eye, vagina, or ear. It is often associated with infection involving internal organs.

Dyspnea: Means difficult breathing. Labored or rapid breathing are common signs of pneumonia.

Listlessness: A lack of alertness in an animal. The animal seems tired compared to other animals in the cage. Animals that are in pain also often seem listless.

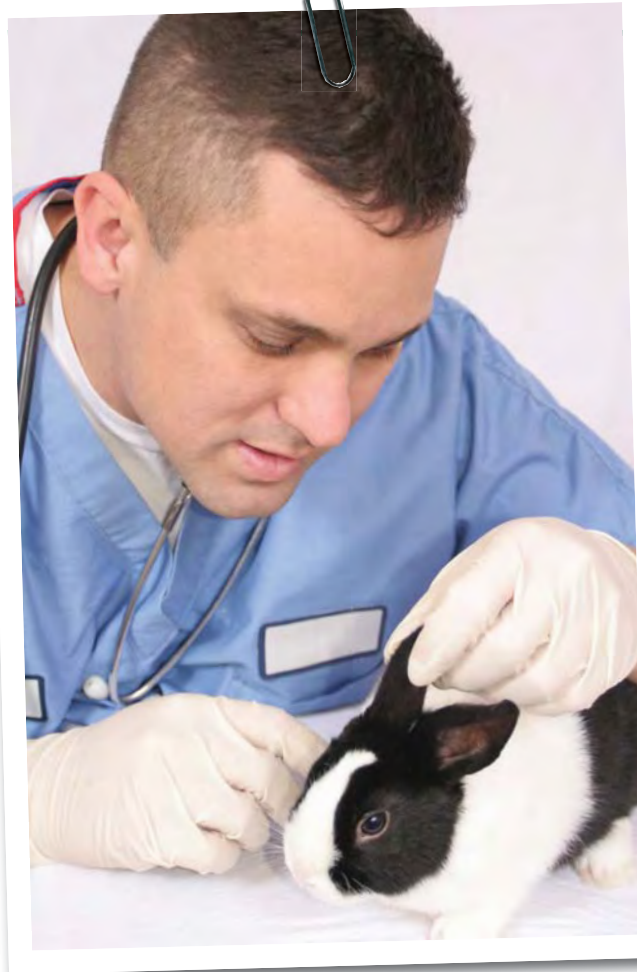
Paralysis: Inability to move all or part of the body. Paralysis may be due to nerve damage of an affected limb or tail or a disease affecting the central nervous system. Paralysis of a limb or tail may be confused with bone fractures of these body parts.

Prolapse: An organ within the body is forced externally. Rectal or vaginal prolapses are most commonly seen, often due to straining during abnormal defecation (bowel movement) or parturition (giving birth).

Pruritus: Constant or frequent scratching is usually due to an irritation of the skin because of external parasites or skin infection. The skin often appears scaly or reddened. Mammals often get infestations of mites (microscopic arachnids) in the ears, which is associated with severe pruritus. Animals with ear mites may tilt an ear or scratch one or both ears. The itching can be so severe that the animal can injure itself from its own scratching.

Rough hair coat: A change from the normal smooth, shiny hair to fur with a ruffled and dull appearance. A rough hair coat can indicate many problems, including vitamin deficiencies, external parasites, internal parasites, and severe infections. This sign is one of the most reliable indications that an animal is ill or in pain or distress.

Seizure: Involuntary muscular movement of the body, such as twitches or shaking that result from abnormal activity in the



brain or spinal cord. Many gerbils tend to have epileptic-type seizures when they are startled. They may freeze in place, twitch, or kick. This situation in gerbils does not require treatment.

Sneezing: A rapid, forced expelling of air through the nose is usually a sign of nasal irritation. An occasional sneeze is not abnormal, but animals that sneeze repeatedly may have an infection of the nasal passages and sinuses. These infections are much more severe than a human cold: they can seriously affect the animal's health and even be fatal. Respiratory infections require veterinary attention.

Stunted: When animals appear much smaller than most animals of the same age. Stunting can be due to genetics, infections, parasites, or poor husbandry. So long as stunted animals have been treated for any health-related problems and provided with good husbandry, these animals can have healthy lives.

Swelling: An abnormal protuberance or localized enlargement. Localized swellings under the skin may be due to infections (abscesses), cysts, hemorrhage, tumors, and occasionally parasites. Swelling may also be generalized to the whole body or major regions of the body, which is indicative of a serious disease.

Tumor: An abnormal growth, swelling, or lump that may be cancerous.

Vomiting: The passage of gastric and intestinal contents from the mouth. This usually indicates that the animal has an irritation in the throat or upper gastrointestinal tract. Vomiting is common in cats, dogs, ruminants, and swine. Rodents, rabbits, and horses do not generally vomit.

Weight loss: A decrease of an adult animal's body weight or a lack of normal growth in a juvenile animal. This is best determined by weighing the animal and comparing to a previous weight or to a known normal weight range. Weight loss may also be qualitatively recognized by evaluating the amount of fat over particular areas of the body (for example, the ribcage for carnivores and hip areas for rodents.) Weight loss is often associated with anorexia due to a serious disease. Rodents that are deprived of water lose body weight due to dehydration.

Some of this material has been adapted from the ALAT Training Manual, American Association for Laboratory Animal Science, Memphis, TN.

Use of Animals in Precollege Education

Overview

This AALAS position statement presents guidelines and resources for the humane care and responsible use of animals in precollege education. This document also offers recommendations on classroom dissection and on the use of animals in science fair projects. All of the resources cited from www.kids4research.org are contained within this booklet.

Introduction

The American Association for Laboratory Animal Science (AALAS) recognizes that the appropriate and humane use of animals in elementary and secondary school classrooms can provide significant educational benefits to these students, including positive interactions between the students and animals that both enhance scientific learning and provide an avenue to promote a sense of responsibility and respect for all living things.

As part of its broader educational mission to ensure that all animal use is performed responsibly and humanely, AALAS has developed a series of species-specific informational pamphlets about animals commonly found in classroom settings, such as mice, rats, hamsters, guinea pigs, rabbits, reptiles, and amphibians. These pamphlets can be found on the AALAS website. Additionally, AALAS recognizes that other organizations have developed similar guidelines and recommends that teachers and educators familiarize themselves with these documents. These guidelines are:

- U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training, as promulgated by the Office of Laboratory Animal Welfare of the National Institutes of Health: <http://grants.nih.gov/grants/olaw/references/phspol.htm#USGovPrinciples>
- Guidelines for Responsible Use of Animals in the Classroom, developed by the National Science Teachers Association (NSTA): <http://www.nsta.org/positionstatement&psid=2>
- The Use of Animals in Biology Education, developed by the National Association of Biology Teachers (NABT): http://www.nabt.org/sub/position_statements/animals.asp
- Guidelines for Ethical Conduct in the Care and Use of Animals, from the American Psychological Association (APA): <http://www.apa.org/science/anguide.html>
- Principles and Guidelines for the Use of Animals in Precollege Education, from the Institute of Laboratory Animal Research (ILAR): http://dels.nas.edu/ilar_n/ilarhome/Principles_and_Guidelines.pdf

Although developed by different organizations, the five documents above have much in common with each other. The ILAR Principles and Guidelines for the Use of Animals in Precollege Education are listed below, with comments that suggest practical approaches to educators who want to ensure the ethical and humane treatment of animals in their classrooms.

Principles and Guidelines for the Use of Animals in Precollege Education

- **ILAR Principle 1. Observational and natural history studies that are not intrusive (that is, do not interfere with an animal's health or well-being or cause it discomfort) are encouraged for all classes of organisms.** When an intrusive study of a living organism is deemed appropriate, consideration should be given first to using plants (including lower plants such as yeast and fungi) and invertebrates without or with primitive nervous systems, including protozoa, planaria, and insects. Intrusive studies of invertebrates with advanced nervous systems (e.g., octopi) and of vertebrates should be used only when lower invertebrates are not suitable, and only under the conditions stated in ILAR Principle 10.
- **ILAR Principle 2. Supervision shall be provided by individuals who are knowledgeable about and experienced with the health, husbandry, care, and handling of the animal species used and who understand applicable laws, regulations, and policies.**

AALAS recommends that educators seek the advice of a veterinarian with demonstrable expertise in laboratory animal medicine before introducing animals in the classroom. The advisor should have formal training in laboratory animal medicine and preferably be a Diplomate of the American College of Laboratory Animal Medicine (ACLAM, <http://www.aclam.org>) or a member of the American Society of Laboratory Animal Practitioners (ASLAP, <http://www.aslap.org>). These professionals are often associated with biomedical institutions. They can provide sound advice on animal husbandry, veterinary care, and regulatory guidelines pertaining to animals in an academic environment.

- **ILAR Principle 3. Appropriate care for animals must be provided daily, including weekends, holidays, and other times when school is not in session. This care must include nutritious food and clean, fresh water; clean housing with space and enrichment suitable for normal species behaviors; and temperature and lighting appropriate for the species.**
- **ILAR Principle 4. Animals should be healthy and free of diseases that can be transmitted to humans or to other animals. Veterinary care must be provided as needed.**

Specific information about commonly used species, such as amphibians, reptiles, mice, rats, hamsters, guinea pigs, and rabbits, can be found on the AALAS website. This information includes physiological data, housing, feeding, handling requirements, and diseases of the species. Links to other websites that may be useful to the teacher or student are also available. Regardless of the animal species used in the classroom, animal records should be maintained by the students

and overseen by the teacher. These records should include the animal's identification, the people responsible for the animals, and a log that describes the date and time of feeding, water changes, and cage cleaning. A brief description of the animal's general health should also be included. Initials of the person who records this information should accompany each entry. AALAS distributes a guideline called Establishing an Animal Care Committee that describes how to plan, care for, and use animals in the classroom. This document is available from the AALAS website.

- **ILAR Principle 5. Students and teachers should report immediately to the school health authority all scratches, bites, other injuries, allergies, or illnesses.**

AALAS recommends that educators contact their administration and health care professionals prior to using animals in the classroom to discuss any relevant issues, such as possible student or staff allergies and diseases that can be transmitted from animals to humans and humans to animals. Recommended publications regarding these issues are "Laboratory Animal Allergy," Volume 42, number 1, 2001, from the Institute of Laboratory Animal Research, National Research Council, available at http://dels.nas.edu/ilar_n/ilarjournal/42_1, and the Caring for Animals sheets "Animals in the Classroom: Allergy and Asthma Considerations" and "Signs of Common Diseases in Classroom Animals" available at <http://www.kids4research.org>.

- **ILAR Principle 6. Prior to obtaining animals for educational purposes, it is imperative that the school develop a plan for the procurement and ultimate disposition of the animals.** Animals must not be captured from or released into the wild without the approval of all appropriate wildlife and public health officials. When euthanasia is necessary, it should be performed in accordance with the most recent recommendations of the American Veterinary Medical Association (AVMA) Guidelines on Euthanasia, and only by someone trained in the appropriate technique.

The AVMA Panel on Euthanasia report is available at http://www.avma.org/issues/animal_welfare/euthanasia.pdf. AALAS strongly recommends that euthanasia be performed with the counsel and advice of a veterinarian.

- **ILAR Principle 7. Students shall not conduct experimental procedures on animals that may cause pain, discomfort, or any disruption of an animal's health or well-being,** including causing nutritional deficiencies or the build-up of toxins and exposure to microorganisms, ionizing radiation, cancer-producing agents, or any other harmful drugs or chemicals capable of causing disease, injury, or birth defects in humans or animals. In general, procedures that cause pain in humans are considered to cause pain in other vertebrates.

AALAS strongly encourages the use of animals in educational experimentation that does not cause them pain and distress, and that does not expose animals or students to harmful infectious, physical, or chemical agents. Suggested sources for information on detecting signs of pain and dis-

tress in laboratory animals are "Signs of Pain and Distress in Classroom Animals," available from <http://www.kids4research.org>, and the advice and guidance of a veterinarian.

- **ILAR Principle 8. Experiments on avian embryos that might result in abnormal chicks or in chicks that might experience pain or discomfort shall be terminated 72 hours prior to the expected date of hatching. The eggs shall be destroyed to prevent inadvertent hatching.**
- **ILAR Principle 9. Behavioral conditioning studies shall not involve aversive stimuli. In studies using positive reinforcement, animals should not be deprived of water; food deprivation intervals should be appropriate for the species but should not continue longer than 24 hours.**
- **ILAR Principle 10. A plan for conducting an experiment with living animals must be prepared in writing and approved prior to initiating the experiment or obtaining the animals.** Developing a proper experimental design that promotes animal welfare is an important scientific learning experience and contributes to establishing a responsible and respectful attitude towards animals. The plan shall be reviewed by a committee composed of individuals who have the knowledge to evaluate it and who have the authority to approve or disapprove it. The written plan should include the following components: a statement of the specific hypotheses or principles to be tested, illustrated, or taught; a summary of what is known about the subject under study, including references; a justification for the use of the species selected and consideration of why a lower vertebrate or invertebrate cannot be used; and, a detailed description of the methods and procedures to be used, including experimental design, data analysis, and all aspects of animal procurement, care, housing, use and disposal.

AALAS recommends the following three references for information about the composition and function of an animal care and use committee:

1. Guide for the Care and Use of Laboratory Animals, National Academy Press, Institute for Laboratory Animal Research at http://dels.nas.edu/ilar_n/ilarhome/guide.shtml.
2. The Institutional Animal Care and Use Committee Handbook, Office of Laboratory Animal Welfare, NIH, which can be found at <http://grants1.nih.gov/grants/olaw/GuideBook.pdf>
3. "Establishing an Animal Care Committee (ACC)" and the complementary "Classroom Animal Care Plan" created by NJABR and the AALAS Foundation, available at <http://www.aalas.org>.

Recommendation on Classroom Dissection

Classroom dissection of nonhuman vertebrate animals is a useful adjunct to the biology curriculum if done with well-defined educational objectives appropriate for the grade level and maturity of the students.



The animal used should represent the lowest phylogenetic species that will satisfy educational objectives. The dissection activity must be well supervised to ensure that:

- students maximize the value of the animals being used.
- the animal specimen is treated respectfully.
- the procedure is done safely.

Alternatives to animal dissection should be used whenever they would adequately serve as substitutes. Students' views on dissection should be openly discussed and respected, with non-dissection alternatives made available when feasible and the student allowed to opt out of the dissection if no alternative is possible.

Recommendation on the Use of Animals in Science Fair Projects

The use of nonhuman vertebrate animals in science fairs is a privilege and should adhere to the same high standards that are used in the scientific community to ensure the welfare of both the animals and the student.

The animals used should represent the lowest phylogenetic species that will satisfy educational objectives.

All animals used must be treated humanely and cared for properly at all times:

- Students using vertebrate animals must follow applicable regulations.

- Animal housing must be comfortable, clean, and free of hazards.
- Animals must have free access to clean water and a food supply.
- Animals must be observed daily, including weekends, holidays, and during vacation periods.
- Provisions must be made to ensure that a safe temperature and humidity level are maintained in the animals' environment.
- Veterinary care must be readily available.

Teachers and students who will handle or care for the animals should be trained in proper methods and techniques so as not to cause harm or stress to the animals, themselves, or others.

Except for observational studies, all research involving vertebrate animals should be directly supervised by the teacher or other professional.

In addition, AALAS recommends that individuals involved in science fairs familiarize themselves with the International Rules for Precollege Science Research: Guidelines for Science and Engineering Fairs, published by Science Service, Washington, DC (<http://www.societyforscience.org/isef/rules/rules10.pdf>). These rules govern all science fair projects at the Intel International Science and Engineering Fair (ISEF) and all affiliated fairs and are a detailed extension of the ILAR Guidelines. Strict adherence to the rules and guidelines governing the use of nonhuman vertebrate animals in this document is recommended.

