Veterinarians Help Animals in Space

A teacher resource developed by the American Veterinary Medical Association

www.avma.org

Why have a teacher guide?

The goal of AVMA sponsored 4th-6th grade learning activities is to heighten awareness of the vital role that veterinary medicine plays in the lives of humans, animals, society, and the environment. This initiative has five objectives:

- To teach children that there is an inseparable relationship between animals and humans
- To teach children that veterinary science makes vital contributions to our world
- To teach children that veterinary science significantly impacts their lives every day
- To interest young students in a career involving biology, mathematics, and applied science
- To promote a greater understanding of the scope of veterinary medicine

Why do veterinarians become astronauts?

Veterinarians who train to become astronauts desire to work with other researchers to study what happens to people and animals in space where there is no gravity—also known as zero-g. They perform experiments on Earth and on space shuttle missions in order to observe the long-term health effects of space travel and a zero-gravity environment on experiments with animals. This kind of research has led to improved lifestyles of astronauts during subsequent space missions and continues to provide new information for future human life in space.

How is the housing of animals different aboard a space shuttle?

Housing animals in space requires specialized equipment and advance planning. For example, if a NASA veterinarian brings a colony of laboratory mice aboard a space shuttle, he or she must consider those animals' needs for housing and nutrition in an environment without gravity. Aquarium-style cages used on Earth will not provide enough traction for mice to walk around; instead, space mice need wire mesh cages so their toes can grip a rough surface. Wood chips used for bedding on Earth can't be used in space because the wood chips will float around. Gravity-feed water bottles also will not work so pressurized water containers are used instead. Compressed food bars take the place of loose, dry food and a special waste containment system cleans the cages and keeps everything from floating.

Does floating instead of walking confuse space animals?

"Amazingly, they adapt very quickly," says Laura Lewis, a member of NASA Ames Institutional Animal Care and Use Committee. "Within five minutes, mice are floating in their living spaces, grooming themselves, and eating, just as they would on Earth.

What are some other behaviors of animals in orbit?

"Fish and tadpoles swim in loops, rather than straight lines, because there is no up or down to orient them," Lewis says. If a light shines, the fish use that as their guide source and swim towards the light. Baby mammals have a hard time in space because they normally huddle together for warmth and, in space, it is difficult to huddle when bodies want to drift and float. It's also harder for babies to nurse when they can't easily locate their mother's nipple.

Why were animals sent into space before people?

When space exploration first began, scientists did not know if humans would survive a trip beyond the Earth's atmosphere. They decided to learn first if animals could survive a space mission. In 1948, a monkey named Albert flew inside a V2 rocket. In 1957, Russian scientists sent a dog named Laika into orbit. Both of these flights proved that animals (and later humans) could survive weightlessness and the effects of high gravitational forces experienced during takeoff and landing.

What are some of the duties of a NASA veterinarian?

Veterinarians are responsible for the health of all the animals at NASA whether on the ground or in space. When a space shuttle experiment involving animals is scheduled, a veterinarian is consulted to ensure that the animals selected are appropriate for those experiments. They also provide instructions for the proper care of the animals during the voyage, including information on how to avoid unacceptable treatments or procedures. At NASA headquarters, the duties of veterinarians include monitoring the health of research animals, planning and conducting experiments, collecting data/measurements, interpreting results of their research, and writing reports on their findings for NASA.

Veterinarians who are selected to be members of space shuttle missions are expected to "pull their own weight" when aboard—even in a weightless environment! They willingly share the day-to-day duties with the rest of the crew to keep the space mission going smoothly.

Enrichment ideas:

The timeline on your poster has an example of a veterinarian who also became a NASA astronaut. Consider extending this lesson using the timeline example.
1993—Dr. Martin Fettman was the first veterinarian to participate in an outer space mission aboard space shuttle Columbia. The space crew studied what happens to people and animals in space where there is no gravity. Their research helped improve the health and safety of astronauts on later space missions.

Glossary:

Astronaut — a person who travels in outer space
Microbe (or **microorganism**) **—** a living plant or animal too small to be seen by the human eye
NASA (The National Aeronautics and Space Administration) — an agency of the United States federal government responsible for the nation's public space program
Space Shuttle — the spacecraft currently used by the United States government for space exploration
Zero-g (or **zero gravity**) **—** the sensation of weightlessness

Additional Resources:

http://history.nasa.gov/animals.html The National Aeronautics and Space Administration
www.thespaceplace.com/shuttle/missions/sts-90.html Columbia space mission
www.nasa.gov/audience/foreducators/5-8/index.html Educator site at NASA
www.usatoday.com/tech/science/space/2007-12-11-nasa_N.htm Space mission
http://webapps.cvm.ncsu.edu/news/view.cfm?id=716 Shuttle Endeavour mission March 2008 from **News and Events** at NC State University – veterinary astronaut, Dr. Linnehan onboard

Student Activities:

4th Grade Activity Sheet: ***Animals in Space***: The students will learn about animal experiments in space while doing research on the history of animals in space. They will create a timeline of important events.

5th Grade Activity Sheet: ***My Profile as an Astronaut***: The students will use the profiles of veterinarians who were also astronauts as a guide to create a profile of themselves as a veterinarian astronaut.

6th Grade Activity Sheet: ***Creating Animal Experiments in Space***: The students will design and document an experiment involving animals to be conducted in outer space.