



careers in

LABORATORY ANIMAL SCIENCE

teacher guide

FOR USE WITH THE FOLLOWING VIDEOS,
FOUND AT ABOUTBIOSCIENCE.ORG:

animal research facility manager

laboratory animal technician

laboratory animal veterinarian

DEVELOPED BY



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BIOMEDICAL RESEARCH

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teacher guide overview

Exciting career opportunities exist for students who are interested in working with animals and making a positive contribution to the lives of millions of people who will benefit from medical research.

This teacher guide is designed to be used in conjunction with the three laboratory animal science videos developed by the North Carolina Association for Biomedical Research (NCABR) for *North Carolina's Bioscience Clearinghouse* (aboutbioscience.org). Options are offered for middle and high school students.

The videos, and the written career profiles that accompany them, can be found at the following URLs:

Animal research facility manager

aboutbioscience.org/animal_rfm.html

Laboratory animal technician

aboutbioscience.org/laboratory_animal_technician.html

Laboratory animal veterinarian

aboutbioscience.org/veterinarian.html

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activity #1: survey

TYPE: Knowledge and opinion survey

GRADE LEVEL: Middle school and high school

TIME NEEDED: 10 minutes

This survey is designed to be administered *before* the students see any videos.

1. Provide one survey per student and ask each student to quickly answer the 11 survey questions.
2. Collect the surveys and store them in a secure file.

At the conclusion of instruction about careers in laboratory animal science, you will hand out a clean set of surveys and have students “retake” the survey.

Then, return to each student his/her original survey and ask each student to compare his/her responses from the first survey to the second.

Discussion questions at the conclusion of this activity may include:

- What have you learned about the use of animals in bioscience research?
- What have you learned about laboratory animal science careers?
- Have you changed your opinions about the use of animals in laboratory science?
- Would you consider pursuing a career in laboratory animal science? Why or why not?

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activity #1: student response sheet

NAME: _____

DATE: _____

Please answer each question as honestly as possible. Your answers will be kept confidential. Use the following scale when selecting your answer:

3 = Agree

2 = Unsure

1 = Disagree

- _____ 1. The primary responsibility of a laboratory animal technician is animal health.
- _____ 2. Much of animal research involves the study of animal behavior.
- _____ 3. A farm is an example of an animal research facility.
- _____ 4. Animals used in research include mice, goats, sheep and rabbits.
- _____ 5. You must have a bachelor's degree to work with laboratory animals.
- _____ 6. All laboratory animal veterinarians work for biomedical research companies.
- _____ 7. Laboratory animals receive regular checkups and vaccinations.
- _____ 8. Most people who work with laboratory animals do not like animals.
- _____ 9. The use of animals in medical research should be prohibited.
- _____ 10. Laws exist that guarantee the best possible treatment for laboratory animals.
- _____ 11. I would consider a career in laboratory animal science.

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activity #2: career poster

TYPE: Poster

GRADE LEVEL: Middle school and high school

TIME NEEDED: 30 minutes *or* homework assignment

This activity is designed to help students focus on the various aspects of a career in laboratory animal science.

1. Determine if this will be a classroom activity or a homework assignment.
2. Make sure you have the proper materials for the activity, which might include one poster board per student, as well as ample markers and art materials. If this is to be a homework assignment, make sure students know the expectations for the poster board needed to complete the assignment and allow plenty of time for students to obtain the needed supplies.
3. Explain to students they will be creating a poster to illustrate a career in laboratory animal science.
4. Have students watch each of the three videos (animal research facility manager, laboratory animal technician and laboratory animal veterinarian) and *take notes* during the videos about the important aspects of each career.
5. After viewing the videos, review important concepts about each career in class. It is best to ask students to share their observations and allow students to write down additional ideas about each career.
6. Assign students to select one of the three careers and develop a poster that illustrates the specific career. The poster must include the name of the career (animal research facility manager, laboratory animal technician or laboratory animal veterinarian) and should include words and pictures that show the tasks, setting and value of the career. Suggest to students they explore the accompanying career profiles at aboutbioscience.org/bc_title.html to find information that will help them get even more information.

Use the *Activity #2: Evaluation Rubric*, on page 5, to evaluate each poster, and display the posters around the school or the classroom.

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activity #2: evaluation rubric

STUDENT NAME: _____

DATE: _____

ITEM EVALUATED	POINTS ALLOCATED				
	SUPERIOR	EXCELLENT	GOOD	FAIR	POOR
Educational value					
a. Learning value of the poster	15	12	9	6	3
b. Interpretation of the career (creativity)	15	12	9	6	3
c. Poster contains accurate information	15	12	9	6	3
d. Information is clear, understandable and spelled correctly	15	12	9	6	3
Quality of work					
e. Imaginative and innovative design	15	12	9	6	3
f. Arrangement is visually appealing	10	8	6	4	2
g. Color and accent are used effectively	5	4	3	2	1
h. Overall appearance is neat and attractive	10	8	6	4	2
Total points (100 possible)	<input type="text"/>				

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activity #3: short essay

TYPE: Writing assignment

GRADE LEVEL: Middle school and high school

TIME NEEDED: 20 minutes *or* homework assignment

This activity is designed to help students focus on the “big picture” purpose of laboratory animal technicians.

Teacher explanation: “Take a look at the logo for International Laboratory Animal Technician Week at the top of the page (*Note: page 7 in this guide*). Based on what you saw in the video about laboratory animal technicians, do you think this is a good logo? Why or why not? Please explain your answer.”

An assignment sheet, *Activity #3: Student Response Sheet*, is provided. Middle school students should be asked to write one paragraph. High school students should be asked to provide examples from the video to support their position.

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activity #4: career chart

TYPE: Web-based research and videos

GRADE LEVEL: High school

TIME NEEDED: 30 minutes *or* homework assignment

This activity is designed to help students use the Internet to find information about instructional programs that lead to careers in laboratory animal science.

1. Give each student a copy of the chart.
2. Have the students watch all three videos (animal research facility manager, laboratory animal technician and laboratory animal veterinarian).
3. Ask students to fill in the “Tasks” column with information that was shared in the videos.
4. Have students complete the chart using the Internet. You might suggest to students they explore the accompanying career profiles at aboutbioscience.org/bc_title.html to find information.

The purpose of the activity is to reinforce the skills necessary to find information, as well as to identify local and state schools that have laboratory animal science programs.

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activity #4: student response sheet

NAME: _____

DATE: _____

CAREER	DESCRIPTION	TASKS	DETAILS	
Animal research facility manager	Provides day-to-day supervision and overall management of laboratory animal care personnel and the animal facility.		Annual earnings	
			Educational requirements	
			Nearest college	
Laboratory animal technician	Provides daily care for the animals used in biomedical research.		Annual earnings	
			Educational requirements	
			Nearest college	
Laboratory animal veterinarian	Provides daily veterinary care for animals. A laboratory animal veterinarian works specifically with research animals.		Annual earnings	
			Educational requirements	
			Nearest college	

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activity #5: video review

TYPE: Video review

GRADE LEVEL: Middle school and high school

TIME NEEDED: 20 minutes

This activity is designed to help students learn about careers in laboratory animal science by watching the three videos (animal research facility manager, laboratory animal technician and laboratory animal veterinarian) and answering comprehension and application questions based on what they saw.

Teacher explanation: “After watching all three videos, you should be able to come to some conclusions about careers that involve working with laboratory animals. Read and answer the questions in the worksheet (*Note: page 11 in this guide*).”

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activity #5: student response sheet

NAME: _____

DATE: _____

1. What do the three careers have in common?

CAREER	HOW ARE THEY ALIKE?
Animal research facility manager (blonde woman)	
Laboratory animal technician (man in blue shirt)	
Laboratory animal veterinarian (woman with glasses)	

2. How is each career different from the other two?

CAREER	HOW IS EACH DIFFERENT?
Animal research facility manager (blonde woman)	
Laboratory animal technician (man in blue shirt)	
Laboratory animal veterinarian (woman with glasses)	

3. The laboratory animal technician said his job is very important because his work with investigators ultimately will “lead to new discoveries.” What kinds of discoveries do you think he was talking about?

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activity #6: web research

TYPE: Web-based research

GRADE LEVEL: High school (advanced)

TIME NEEDED: 30 minutes *or* homework assignment

This activity is designed to challenge students to apply their thinking and analytical skills and to use technology (the Internet) to learn about responsible laboratory animal care and use in biomedical research, testing and education.

This activity can be accomplished in one class period in a computer lab *or* as a homework assignment.

Assignment preparation: Ask students the following questions:

- Have you ever heard of the old saying “man’s best friend”?
- Who, or what, is “man’s best friend?” (*Note: Most students will answer “a dog”*)
- Why?
- If the saying “man’s best friend” were updated for the 21st century, how might it be changed? (*Note: Students might consider gender inclusion and suggest “a person’s best friend”*)

Explain:

- Today in the computer lab, you will have an opportunity to apply the old saying “man’s best friend” to the use of laboratory animals.
- Go to the *Kids 4 Research* Web site (kids4research.org) and study the different animals, diseases and product safety concerns described. Decide which animal you really would call “man’s best friend,” based on that animal’s contribution to the health and well-being of society. Be sure you can use facts and data to support your conclusion.

Option:

- Randomly draw the names of two students, let each stand and, using his/her notes, tell the class why his/her choice really is “man’s best friend.” Let students vote on who made the best case.

standards crosswalk

NORTH CAROLINA UNIFYING CONCEPTS OF SCIENCE

Unifying concepts, as identified by the National Science Education Standards, are addressed in the three *Careers in Laboratory Animal Science* videos (animal research facility manager, laboratory animal technician and laboratory animal veterinarian) as follows:

- **Systems, order and organization:** An important part of understanding and interpreting the world is the ability to think about the whole in terms of its parts and, alternatively, about parts as they relate to one another and to the whole. The videos demonstrate how scientists use biological systems (animals) as a partner in scientific research, allowing for the development of biomedical products and services. Reference is made to the similarity between animal and human body systems.
- **Evidence, models and explanation:** Evidence is defined by the National Science Education Standards as observations and data on which to base scientific explanations. In biomedical research, animal models are used as complex systems in the development of scientific knowledge that can improve the health of humans and animals. The videos demonstrate how these animals are observed and cared for in research facilities.
- **Change, constancy and measurement:** Through observations, students learn about the characteristics of living things. The videos demonstrate that it is through direct observation and data collection that professionals in laboratory animal science are able to provide information to researchers about the behavior and reaction of animals under controlled research conditions.
- **Evolution and equilibrium:** Evolution represents change in systems. Laboratory animal technicians continuously are reviewing and recording animal behavior and physical response, both to see what changes occur and to record efforts of a species to compensate for change.
- **Form and function:** Students should be able to explain form and function and how the two are interrelated. Many of the student assignments in this guide require students to analyze careers in laboratory animal science and consider the interrelationship among these careers.

NATIONAL HEALTH CARE SKILL STANDARDS

The following standards and accountability criteria are addressed in the videos and in this guide:

- 3.11 Understand the health care delivery system (public, private, government and nonprofit)
- 4.11 Classify personal traits or attitudes desirable in a member of the health care team.
- 4.12 Summarize basic professional standards of health care workers as they apply to hygiene, dress, language, confidentiality and behavior.
- 4.31 Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services or biotechnology research and development).
- 4.32 Recognize levels of education, credentialing requirements, employment opportunities, workplace environments and career growth potential.
- 6.21 Apply ethical behaviors in health care.
- 7.11 Explain principles of infection control.
- 7.21 Apply personal safety procedures based on OSHA and CDC regulations (including standard precautions).
- 7.31 Evaluate environment to recognize safe and unsafe working conditions.
- 8.12 Recognize characteristics of effective teams.

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career profile: animal research facility manager

quick facts

Salary range:

\$40,000 to \$180,000 per year

Minimum education:

Bachelor's degree

An animal research facility manager is responsible for the day-to-day supervision and overall management of laboratory animal care personnel and the animal facility. Some of the manager's functions include procurement of animals for research and teaching purposes, supervision of animal laboratory technicians and other part-time personnel, control of animal holding facilities and helping to obtain proper veterinary care for the animals. In addition, managers are responsible for ensuring conditions vital to the well-being of animals continuously are met in accordance with the Animal Welfare Act as implemented through the Department of Agriculture regulations and, for federally funded research, the U.S. Public Health Service Policy on Humane Care and Use of Laboratory Animals.

More specific job duties can include the following: implementing and evaluating new procedures; monitoring experiments to ensure research study protocols are being followed and notifying proper personnel if deviations are noted; participating in Institutional Animal Care Use Committee (IACUC) meetings; and coordinating facility inspections.

Animal research facility managers ensure, by performing and/or delegating necessary functions, that animals are provided feed, water, bedding and clean cages, according to their individual care requirements. Managers also ensure that proper environmental conditions (temperatures, light levels and ventilation) are met at all times. They track and record relevant data. Managers ensure that animals are healthy by observing animals daily for signs of illness or disease, testing for parasites and coordinating necessary care with veterinarian(s).

Managers also might coordinate the ordering and receiving of animals, ensuring that the animals arrive in time for classroom or research use, that appropriate housing is available and that all procurement specifications are met. They inventory shipments, check health status and input data in the record system.



On a day-to-day basis, animal research facility managers oversee operation and maintenance of the facility's surgical suite, making sure that sterile supplies are stocked and that housekeeping and sanitation practices consistently are performed. They ensure the chemical room, instrument room and support spaces are cleaned, stocked with supplies and able to be used effectively. Managers maintain all required facility records, including daily inspection logs, health records, protocols, censuses and facility records, in computer databases and paper files.

The facility manager also is responsible for breeding animals for use in teaching and research projects. Managers communicate regularly with both faculty and student research personnel regarding the condition of the animals and on any issues related to their care. They assist faculty and students in conducting animal research projects, including presurgical and postsurgical care, injections, drug administration and more.

education/training

Most often, a bachelor's degree in a relevant discipline is required for being an animal research facility manager. A minimum of three years of animal facility experience or the equivalent combination of education and experience typically is required. Sometimes, the hiring facility requires a minimum of five years of animal facility experience and membership in the American Association of Laboratory Animal Science.

certification

Some research institutions require the manager to be certified as a laboratory animal technologist, which can be done through the American College of Laboratory Animal Medicine, an organization of board-certified veterinary medical specialists who are experts in the humane, proper and safe care and use of laboratory animals. ACLAM establishes standards of education, training, experience and expertise necessary to become qualified as a technologist and recognizes that achievement through board certification.

salary

Supervisor range: \$41,000 to \$60,000 per year

Manager range: \$61,000 to \$89,000 per year

Director range: \$139,000 to \$180,000 per year

These figures are based on the *2002 AALAS Laboratory Animal Facility Compensation Survey* and have been adjusted for inflation. Salaries vary depending upon the job, education and training, level of experience and geographical area of the country.

► [go to aboutbioscience.org/animal_rfm.html](http://aboutbioscience.org/animal_rfm.html) to watch the animal research facility manager video

careers in

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career profile: laboratory animal technician

quick facts

Salary of top 10 percent:
\$41,246 per year or more

Minimum education:
Certificate

The biomedical research facility is one of the primary settings in which a laboratory animal technician works. Some of the technician's typical duties include administering medications to lab animals orally or topically, preparing samples for laboratory examinations and recording information about an animal's genealogy, diet, weight, medications, food intake and clinical signs of pain and distress. Some laboratory animal technicians, also called veterinary technologists, vaccinate newly admitted animals and occasionally are required to euthanize seriously ill, injured or unwanted animals.

Technicians handle ordering supplies and instruments and performing minor equipment maintenance. In addition, they assist medical personnel during animal surgery. They may provide routine preoperative and postoperative care, perform standardized laboratory tests on animal specimens and report findings. Other surgical duties can include catheterizing, starting intravenous injections and administering anesthesia and drugs. Laboratory animal technicians also maintain the lab operating room by following established standards of sanitation, including sterilizing laboratory and surgical equipment.

At research facilities, veterinary technologists typically work under the guidance of veterinarians, research physicians and other laboratory technicians. Some also find job opportunities in wildlife medicine, the military, livestock management and pharmaceutical sales.

education/training

There are primarily two levels of education and training for entry into a career as a laboratory animal technician: a two-year program for veterinary technicians and a four-year program for veterinary technologists. Most entry-level veterinary technicians hold a two-year degree — usually an associate's degree from an accredited community college program in veterinary technology. These programs teach courses in clinical and laboratory settings using live animals, and there are more than 100 throughout the United States. Distance-learning programs also are available. About 15 colleges offer longer veterinary technology programs, which culminate in a four-year bachelor's degree in veterinary technology. These four-year colleges, in addition to some vocational schools, also offer two-year programs in



laboratory animal science. The cost of these programs varies from school to school. You should contact the school of your choice, which will be able to provide information on tuition and financial aid.

Individuals interested in careers as veterinary technologists and technicians should take as many high school science, biology and math courses as possible. Science courses taken beyond high school, in an associate or bachelor's degree program, should emphasize practical skills in a clinical or laboratory setting.

Technologists and technicians usually begin work as trainees in routine positions under the direct supervision of a veterinarian. Entry-level workers whose training or educational background encompasses extensive hands-on experience with a variety of laboratory equipment, including diagnostic and medical equipment, usually require shorter periods of on-the-job training. As technologists and technicians gain experience, they assume more responsibility and perform more assignments under only general veterinary supervision. Some of these individuals eventually can become supervisors.

certification

Employers in this career area recommend the American Association for Laboratory Animal Science certification for those seeking employment in a research facility. AALAS offers certification for three levels of technician competence, with a focus on three principal areas: animal husbandry, facility management and animal health and welfare. Individuals who wish to become certified must satisfy a combination of education and experience requirements prior to taking an exam. Required work experience must be related directly to the maintenance, health and well-being of laboratory animals and must be gained in a laboratory animal facility as defined by AALAS. Candidates who meet the necessary criteria can begin pursuing the desired certification on the basis of their qualifications. The lowest level of certification is assistant laboratory animal technician, the second level is laboratory animal technician and the highest level is laboratory animal technologist.

Currently, there is a strong demand for graduates from veterinary technology programs. In 2004, the Department of Labor listed veterinary technicians as one of the 20 fastest-growing careers in health care occupations. Veterinary technicians can find employment in veterinary practices, biomedical research, education, zoo/wildlife medicine, industry, military, livestock-health management, pharmaceutical sales and business ownership. The employment opportunities seemingly are endless and at the present time are plentiful. The demand for fully trained, competent animal care technicians in the field of laboratory animal science only will increase as the need for more medical and scientific advances continues to grow.

salary

The median hourly earnings for veterinary technicians were \$13.89 as of May 2004. The middle 50 percent earned between \$11.44 and \$16.87, the bottom 10 percent earned fewer than \$9.86 and the top 10 percent earned more than \$19.83. These figures have been adjusted for inflation.

► [go to aboutbioscience.org/laboratory_animal_technician.html](http://aboutbioscience.org/laboratory_animal_technician.html) to watch the laboratory animal technician video

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career profile: laboratory animal veterinarian

quick facts

Average salary range:

\$146,974 to \$193,388 per year

Minimum education:

Doctorate

Laboratory animal veterinarians must be prepared to care for a large variety of species, most of which are not common to traditional veterinary practice. The unique biological qualities, nutritional and environmental requirements and diseases of these animals provide interesting challenges for their cultivation and clinical management. The animals used in research investigations must be free of unwanted spontaneous disease, and the laboratory animal veterinarian is trained to manage such diseases in animal populations and advise researchers regarding implications this might have for research.

education/training

Prospective veterinarians must graduate with a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree from a four-year program at an accredited college of veterinary medicine and must obtain a license to practice. Before practicing, all veterinarians must have two or more years of postdoctoral training, or one year of postdoctoral training plus one year of experience in the practice of institutional animal medicine.

Twenty-eight colleges in 26 states meet accreditation standards set by the Council on Education of the American Veterinary Medical Association, and the prerequisites for admission vary. Many of the colleges do not require a bachelor's degree for entrance but all require a significant number of credit hours—ranging from 45 to 90 semester hours—at the undergraduate level. However, most students admitted have completed an undergraduate program. Applicants without a bachelor's degree will find it hard to be admitted.

Pre-veterinary courses emphasize the sciences. Veterinary medical colleges typically require classes in organic and inorganic chemistry, physics, biochemistry, general biology, animal biology, animal nutrition, genetics, vertebrate embryology, cellular biology, microbiology, zoology and systemic physiology. Some programs require calculus, while others require only statistics, college algebra and trigonometry, or precalculus. Most veterinary medical colleges also require core courses, including coursework in English or literature, the social sciences and the humanities. Courses in practice management and career development increasingly are becoming a standard part of the curriculum to provide a foundation of general business knowledge for new graduates.



In addition to satisfying pre-veterinary course requirements, applicants must submit test scores from the Graduate Record Examination, the Veterinary College Admission Test or the Medical College Admission Test, depending on the preference of the college to which they are applying. Currently, 22 schools require the GRE, four require the VCAT and two accept the MCAT.

In admittance decisions, some veterinary medical colleges place heavy consideration on a candidate's veterinary and animal experience. Formal experience, such as work with veterinarians or scientists in clinics, agribusiness, research or some area of health science, particularly is advantageous. Less formal experience, such as working with animals on a farm or ranch or at a stable or animal shelter, also is helpful. Students must demonstrate ambition and an eagerness to work with animals.

There is keen competition for admission to veterinary school. The number of accredited veterinary colleges has remained largely the same since 1983, whereas the number of applicants has risen significantly. Only about one in three applicants was accepted in 2004. Education in AVMA-recognized veterinary specialties — such as pathology, internal medicine, dentistry, nutrition, ophthalmology, surgery, radiology, preventive medicine and laboratory animal medicine — usually is obtained through a two-year internship. Interns receive a small salary but usually find that their internship experience leads to a higher starting salary relative to the salaries of other starting veterinarians. Veterinarians who seek board certification in a specialty also must complete a three- to four-year residency program that provides intensive training in specialties such as internal medicine, oncology, radiology, surgery, dermatology, anesthesiology, neurology, cardiology, ophthalmology and exotic, small animal medicine.

certification

All states and the District of Columbia require that veterinarians be licensed before they can practice. The only exemptions are for veterinarians working for some federal agencies and state governments.

salary

The average salary for American College of Laboratory Animal Medicine-certified laboratory animal veterinarians varies based on place of employment. The average annual salary for certified laboratory animal veterinarians working at a college or university is \$154,103; for those working in the research industry, it is \$193,388; for those working for the government, it is \$146,974; and for those working for a hospital or nonprofit organization, it is \$163,849.

These figures are based on the *2005 Salary Survey of Laboratory Animal Veterinarians* conducted by the American College of Laboratory Animal Medicine and the American Society of Laboratory Animal Practitioners and have been adjusted for inflation.

► [go to aboutbioscience.org/veterinarian.html](http://aboutbioscience.org/veterinarian.html) to watch the laboratory animal veterinarian video

DEVELOPED BY



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