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INTRODUCTION TO LABORATORY ANIMALS

lesson 1



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PREFACE

CONGRATULATIONS!

You are registered for the PMI Nutrition International sponsored correspondence course. Whether you are just starting your career in Laboratory Animal Science or you have decided that you want to know more about the work you are doing, you have made an important decision. You are serious about your work and want to know more about your job in Laboratory Animal Science.

This course is designed for you. It consists of six study sections, each containing a great deal of new information. Also included with each section is a complete glossary of important words, abbreviations, acronyms and their definitions.

As an animal technician, you are a significant member of the scientific research team at your institution. It is the purpose of this course to provide you with information you need to effectively work on that team. So congratulations again, you have taken the first step towards becoming a knowledgeable technician.

If you have any questions about this course, you may call the LabDiet® Business Office in St. Louis, MO (314)768-4861 or (314)768-4100 for help.

WHAT'S NEXT?

That's easy. Start reading! Serious study and commitment will be required to master all of the information, but the course is set up in an easy-to-learn format. Each section will take about two weeks to cover, if you study on a regular basis. However, if it takes longer to complete a section, don't worry – there is no time limit for finishing the course.

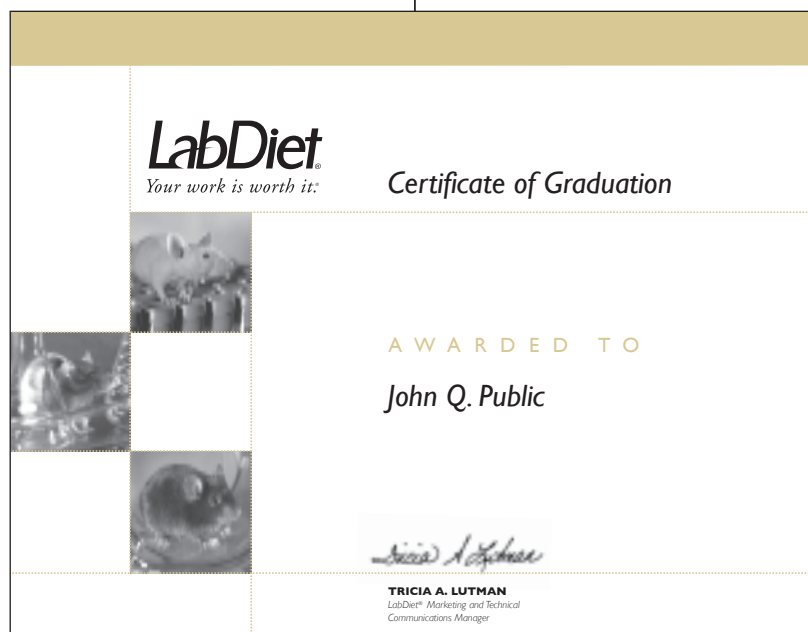
Work at your own pace. This course is designed so that each person can learn and finish the program at their own speed. If there are parts you find particularly difficult, you may wish to consult your supervisor or some other knowledgeable person for assistance.

At the end of each section is a set of questions. To obtain a completion certificate for this course, you must answer those questions. You may use the PMI LabDiet® Laboratory Animal Care Course manual or other reference material of your choice to help you answer the questions.

If working at an institution, submit your answers to your supervisor for grading. After you have completed the entire course, your supervisor will need to send your graded test results to:

PMI Nutrition International LLC – LabDiet®
Laboratory Animal Care Course
PO Box 66812
St. Louis, MO 63166-6812

A certificate will be issued by PMI Nutrition International upon completion of the self-study program. A copy of a certificate is exhibited below.



MANAGEMENT OF LABORATORY ANIMALS

A. HISTORY

ANIMALS AND HUMANS

Animals have always provided us with many of our most important needs. Animals provide us food in the form of meat, milk, and eggs. For clothing they give us wool, leather, furs, and feathers. Primitive societies even use hides and bones to build shelters.

Civilization might never have developed without the help of animals, and their work as beasts of burden.

In the U.S., mules carry us or our equipment into remote areas of the mountains and plains. People ride horses for both work and pleasure. Cats and dogs share our lives along with fish and ferrets, rabbits and rodents, parrots, snakes and amphibians. They are our companions and even entertain us. Animals work for us too. Elephants in India, Africa, Thailand and much of Southeast Asia, move trees and help clear the land as well as being an integral part of the ceremonial culture of these lands. Dogs herd and protect sheep in many parts of the World, including the United States. They are partners in both civilian and military law enforcement. An example of their use is for sniffing out drugs in airports and at customs stations.

Specially trained animals such as seeing eye and hearing ear dogs and capuchin monkeys help their physically challenged owners to function independently in today's world. Dogs, cats, rabbits, other small animals, and even farm animals like goats, sheep and horses are regular visitors to individuals confined to nursing homes. Visiting animals bring a special kind of emotional therapy so welcome to the elderly and those suffering from Alzheimer's. This role of animals has been documented as having a profound effect on blood pressure, cognitive and motor functions as well as bringing smiles to the faces of all involved. A number of hospitals are now considering adding animals to their physical therapy and rehabilitation programs.

Animals also serve as research subjects. For hundreds of years animals have been used in medical, biological, and agricultural research. Because of their contributions, we can now diagnose, treat, and even prevent many diseases that have plagued humans and animals in the past. Thousands of

human and veterinary medical discoveries can be attributed directly to research using animals, for example:

- Control of dietary diseases such as rickets (Vitamin D deficiency) and scurvy (Vitamin C deficiency).
- Understanding of nutritional requirements for good health.
- Vaccines, for smallpox, cholera, polio, dog and cat distemper, horse encephalitis, and cat leukemia.
- Control of hormonal diseases such as diabetes.
- Development of new surgical techniques such as organ transplants, correction of malformations seen at birth such as the abnormal hearts in "blue babies," and surgical treatment of various forms of cancer.
- Development of many important drugs such as antibiotics, medicine to control blood pressure and high cholesterol and agents to prevent the rejection of transplanted organs.

LABORATORY ANIMAL SCIENCE

The first documented use of research animals took place in Alexandria, Egypt, over 2,000 years ago. A Greek physician "discovered" that air was necessary for pigeons to live. He was not able to determine exactly why animals require air because scientists had not yet discovered oxygen.

After the first experiment, various physicians and scientists used animals to study **anatomy** and **physiology**, but it was not until 1628 that the first of what we could call "real" physiology was reported. In that year, a scientist named William Harvey discovered how blood flowed through the blood vessels. Since Harvey's discovery, animals have been used in many areas of medical, biological, and agricultural research.

Since the early 1900's, we have been the beneficiaries of tremendous advancements in medical, biological, and agricultural knowledge – most due to research conducted on animals. This rapid rate of scientific advancement continues today throughout the world.

You are a member of an exciting and ever expanding scientific field --Laboratory Animal Science. As a distinct profession, Laboratory Animal Science began in Chicago in 1950 when five veterinarians decided that the care of Laboratory animals needed improvement for the benefit of both animals and science. They believed that better experimental design and analysis would need uniformly healthy and genetically stable animal subjects.

They understood that better care for the animals, improved the animal's well-being. This, in turn, fostered more humane care and use of laboratory animals. These five veterinarians founded the Animal Care Panel. In 1967, the Animal Care panel became the American Association for Laboratory Animal Science (**AALAS**, see Section 2, Organizations, for details about AALAS).

As the specialty of Laboratory Animal Science developed, it became clear that one of the most important members of the research team is the animal care provider. These providers of the day-to-day care for research animals directly influence the outcome of research activities. They are major contributors to the animals' well-being and to the research outcome. Therefore, it is important that you understand how your activities affect the animals under your care. It is the purpose of this course to provide you with the information necessary to gain that understanding.

B. WHAT IS AN "ANIMAL?"

GENERAL DEFINITION OF ANIMAL

An animal is a complex organism made up of many systems and organs, each performing a specific function for growth, the normal maintenance of life, and reproduction. These specialized systems and organs are composed of cells (See Section on Anatomy and Physiology) which are the smallest, but most complex, of all living units.

In general, all animals share three characteristics:

- Capable of reproduction - usually sexual reproduction.
- Generally, can move about voluntarily
- Obligated to ingest (eat) **organic** matter (food) to survive - that is, they cannot produce their own food from **inorganic** matter through **photosynthesis**.
- Most animals require oxygenated air to survive.

In the context of this course, the term "animal" will be used to include vertebrate and invertebrate animals. Vertebrates (or vertebrate animals) have a spine, such as mammals, birds, reptiles, amphibians, and fish. Invertebrates (invertebrate animals) lack a spine, such as crabs, shrimp, and snails.

However, only vertebrates will be presented in this course.

While invertebrate animals will not be discussed in this course, you should be aware that a number of invertebrate species are used in research. It is possible that you may one day find yourself caring for a colony of lobsters or praying mantis, but the special care required for the many and diverse species of invertebrates is beyond the scope of this course.

LABORATORY ANIMALS

Laboratory animals include those animals which have been used in medical, veterinary, agricultural, or biological research. Traditionally, the term laboratory animals has meant rodents (such as rats, mice, and hamsters), rabbits, dogs, cats, and non-human primates (such as monkeys and chimpanzees); however, in modern research facilities, you may find many other species.

Mammals

Mammals are warmblooded vertebrates that have the characteristic of nourishing offspring with the milk of mammary glands. Mammals require **oxygenated air** to survive. Mammals are classified as *Mammalia* in the Animal Kingdom. Mammals most commonly used for research purposes include:

- | | |
|----------------------|------------|
| • mice | • rats |
| • guinea-pigs | • hamsters |
| • gerbils | • rabbits |
| • dogs | • cats |
| • non-human primates | • ferrets |
| • swine | • sheep |
| • cattle | • goats |