

Animal Research

OBJECTIVES/RATIONALE

Animals are an important part of medical research. The selection of research animals is an aspect of the research project. The student will identify animals used in medical research.

TEKS 121.5 1A, 1B, 1C

TAKS ELA 1, 4

KEY POINTS

I. Research

A. Research involves three major lines of inquiry

1. Research must be done to determine the best feeds and medications available for various species of animals
2. Development of meat animals with appeal and nutritional value for the consumer.
3. Pharmaceutical and Medical Research
4. Genetic research

B. Research projects are conducted by/for

1. colleges and universities
2. pharmaceutical industry
3. feed companies
4. zoo/wildlife agencies
5. state and federal agencies

C. Laboratory Animals

1. must be uniform in size
2. normal and healthy
3. usually bred and raised specifically for laboratory use
4. Small animals are preferred –
 - a. Have shorter life cycles
 - b. Have shorter gestation periods
 - c. Young require lactation for less time
 - d. Small animals usually have large litters
 - e. Short life cycles of small animals allow the production of inbred strains in a short period of time
5. Types of small animals utilized
 - a. Rats
 - (1) Weigh 5-6 grams at birth and reach 250-450 grams at maturity
 - (2) Sexually mature at 80 – 90 days with a gestation period of 21 days
 - (3) Average litter size is 9-11 and they are weaned at 21-23 days
 - (4) Total life span is 2-3 years
 - (5) Nocturnal and sleep during the day
 - b. Mice

- (1) Weigh 1 – 1 ½ grams at birth and reach 18-40 grams as adults
 - (2) Sexually mature at 60 days and gestation period is 19 days
 - (3) Average litter size is 10-12 and they are weaned in 18-21 days
 - (4) Total life span is 1-2 years
 - (5) Used extensively in studies of heredity and genetic traits and for cancer research
 - (6) Smallest laboratory animal and is in the greatest demand
- c. Gerbils
- (1) Weigh 2 ½ - 3 grams at birth and reach 70-90 grams as adults
 - (2) Sexually mature at 4-7 weeks and gestation period is 24 days
 - (3) Average litter size is 5 and they are weaned in 22-24 days
 - (4) Total life span is 2-4 years
 - (5) Drink very little water
 - (6) Mate for life
 - (7) Have convulsions or seizures when excited
- d. Hamsters
- (1) Weigh about 2 grams at birth and reach 90-140 grams as adults
 - (2) Sexually mature at 7 weeks and gestation period is 16 days
 - (3) Average litter size is 6-8 and they are weaned in 21-23 days
 - (4) Total life span is 2-3 years
 - (5) Have cheek pouches and very short tails
 - (6) The males have extended scrotums
- e. Guinea pigs – probably the best known laboratory animals
- (1) Weigh 70-80 grams at birth and reach 600-800 grams as adults
 - (2) Sexually mature at 8 weeks and gestation period is 68 days
 - (3) Average litter size is 3 and they are weaned at 2-3 weeks
 - (4) Total life span is 6 years
 - (5) Require vitamin C and thus are useful in vitamin research
- f. Rabbits
- (1) Weigh 64 grams at birth and reach 4 ½ - 5 ½ kilograms as adults
 - (2) Sexually mature at 5-9 weeks and gestation period is 30-32 days
 - (3) Average litter size is 8 and they are weaned in 6-8 weeks
 - (4) Total life span is 6-8 years
- g. Dogs – the beagle is used most often in experiments because of its size and temperament
- (1) Beagles weigh 300-400 grams at birth and reach 13-18 kilograms as adults
 - (2) Sexually mature at 9-12 months and gestation period is 63 days
 - (3) Average litter size is 6 and they are weaned in 6-8 weeks
 - (4) Total life span is 13-17 years
 - (5) Used in research in pharmacology, physiology, surgery, nutrition and behavioral studies
- h. Cats – the average laboratory cat has short hair and is a mixed breed
- (1) Weigh 125 grams at birth and reach 2-4 kilograms as adults
 - (2) Sexually mature at 6-9 months and gestation period is 62 days
 - (3) Average litter size is 4 and they are weaned at 6-8 weeks

- (4) Total life span is 13-17 years
- (5) Used in such areas as physiology, anatomy, pharmacology, and behavioral studies
- i. Rhesus monkey – most commonly used nonhuman primate
 - (1) Weigh 500-700 grams at birth and reach 5-13 kilograms as adults
 - (2) Sexually mature at 1 ½ - 4 years and gestation period is 165-170 days
 - (3) Average offspring for each pregnancy is 1 and they are weaned at 6 months
 - (4) Total life span is about 15 years
 - (5) Many problems in the use of nonhuman primates as laboratory animals
 - (a) Must be captured in the wild and then domesticated because they do not reproduce well in the laboratory
 - (b) Have a long gestation period that usually only yields one offspring
 - (c) They are expensive in initial cost, transportation housing
 - (d) Difficult animals to handle
 - (6) Used extensively in studies of the Rh blood factor and in diseases common to humans and nonhuman primates.

ACTIVITIES

- I. Research and report on animals that are used in medical and pharmaceutical research.

MATERIALS NEEDED

Animal Research Quiz – Key

ASSESSMENT

Animal Research Quiz

ACCOMMODATIONS

For reinforcement, the student will design a poster identifying animals used in medical research.

For enrichment, the student will design a research project and select the appropriate animals.

REFLECTIONS

Animal Research Quiz

1. Name the major areas of research using animals.
2. What three general characteristics should laboratory animals possess?
3. Name three laboratory animals used in the past in research. Tell how each was used.
4. List the animals most commonly used today.
5. Give reasons why large animals are selected less often than small animals for research.
6. List four reasons why research results are obtained faster with small animals.
7. Which of the commonly used animals could be suggested for use to meet the following research requirements?
 - a. very short gestation period
 - b. little water consumption
 - c. large litters
 - d. animal to live over 12 years
 - e. kept in shallow cages without escaping
 - f. nonhuman primate
8. What general care must be given to all research animals?

Animal Research

Quiz - KEY

1. Name the major areas of research using animals.

Research must be done to determine the best feeds and medications available for various species of animals, Development of meat animals with appeal and nutritional value for the consumer, Pharmaceutical and Medical Research, Genetic research

2. What three general characteristics should laboratory animals possess?

Uniform in size, normal, health

3. Name three laboratory animals used in the past in research. Tell how each was used.

(Any three): deer—blood circulation; dogs—diabetes or heart surgery; rats—rickets; guinea pigs—vitamin C studies; rabbits—diphtheria sera; monkeys—poliomyelitis vaccine

4. List the animals most commonly used today.

Rats, mice, gerbils, hamsters, guinea pigs, rabbits, dogs, cats, and some primates

5. Give four reasons why large animals are selected less often than small animals for research.

Housing costs more; feed costs more; care costs more; results are obtained faster with small animals

6. List four reasons why research results are obtained faster with small animals.

Shorter life spans, shorter gestation periods, young require lactation for less time, have larger litters

7. Which of the commonly used animals could be suggested for use to meet the following research requirements?

- a. **very short gestation period**—hamster
- b. **little water consumption**—gerbil
- c. **large litters**—mouse
- d. **animal to live over 12 years**—dog, cat, or primate
- e. **kept in shallow cages without escaping**—guinea pig
- f. **nonhuman primate**—rhesus monkey

8. What general care must be given to all research animals?

Provide food and water; clean, appropriate housing; exercise and rest