

Unit C: Meeting Nutritional Needs of Animals

Lesson 1: Meeting the Nutritional Needs of Animals

Student Learning Objectives:

Instruction in this lesson should result in students achieving the following objectives:

1. Explain the functions of feed.
2. Identify the various feed types and their characteristics.
3. Explain how animals are fed.

Recommended Teaching Time: 1 hour

Recommended Resources: The following resources may be useful in teaching this lesson:

- Baker, M & Mikesell, R.E. *Animal Science Biology and Technology*. Danville, IL: Interstate Publishers, Inc. 1996.
- Ensminger, M.E. *Animal Science*. Danville, IL: Interstate Publishers, Inc. 1991.
- Gillespie, J.R. *Modern Livestock and Poultry Production, 6th Edition*. Albany, NY: Delmar. 2002.
- Lee, Jasper S., Hutter, J., Rudd R., Westrom, L., Bull, A.M., Embry Mohr, C. & Pollock, J. *Introduction to Livestock and Companion Animals 2nd Edition*. Danville, Illinois: Interstate Publishers, Inc., 2000.

List of Equipment, Tools, Supplies, and Facilities:

- Writing surface
- PowerPoint Projector
- PowerPoint Slides
- Transparency Masters
- Samples of corn, cottonseed meal, hay

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slides 2 and 3):

- | | |
|---|---|
| <ul style="list-style-type: none">• Animal proteins• Basal maintenance requirement• Concentrates• Feed• Feedstuff• Fetus• Forages• Free access• Gestation• Growth• High-energy concentrates• High-protein concentrates | <ul style="list-style-type: none">• Lactation• Legume• Maintenance• Nodules• Nonlegume roughages• Palatability• Roughages• Scheduled feeding• Supplement• Tankage• Vegetable proteins |
|---|---|

Interest Approach:

Have samples of corn, cottonseed meal, and hay placed in front of the class. Ask the students to make a list of the similarities and differences between the three types of feed. Make a class list of similarities and differences on the board. Tell the students to keep their lists and to refer back to it as the lesson progresses.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Explain the functions of feed.

Anticipated Problem: What are the functions of feed?

(PowerPoint Slide 4)

- I. The nutritional needs of animals change throughout the animal's life. The amount and type of feed depends on the stage of life and use of the animal. The feed consumed by the animal is used for various purposes. These uses or functions can be categorized into the following groups:

(PowerPoint Slides 5 and 6)

- A. Maintenance—**Maintenance** is keeping the body at a constant state. There is no loss or gain of weight. Every second an animal is alive it requires energy. The amount of energy needed by an animal for maintenance is known as **basal maintenance requirement**. A maintenance diet is usually high in carbohydrates and fats. It should contain a small amount of protein, minerals, and vitamins. On average, about 50 percent of an animal's diet is used for maintenance.

(PowerPoint Slides 7 and 8)

- B. Growth—**Growth** is defined as the increase in size of the muscles, bones, internal organs, and other parts of the body. Animal growth requires mostly energy and smaller amounts of other nutrients. Very high levels of carbohydrates and fats in the animal's diet provide this energy.
- C. Reproduction—Proper nutrition is the key to successful and efficient reproduction in animals. Most reproductive failures are caused by poor nutrition in the female. A proper reproduction ration typically includes higher levels of protein, minerals, and vitamins. This is especially needed in the last three months of **gestation** (pregnancy) because this is when the **fetus** or unborn offspring experiences the most growth. Poor nutrition also affects males. A lack of proper nutrients can lower sperm production and fertility rates.

(PowerPoint Slide 9)

- D. Lactation—**Lactation** is the production of milk. The nutrient requirements for moderate to heavy milk production are greater than the requirements during gestation. A lactation ration requires even higher levels of protein, calcium, and phosphorus.
- E. Work—A work ration is needed by animals that are expected to conduct all types of work and activity for the operation. Examples could include draft animals, racehorses, and hunting dogs. These animals require increased carbohydrates and fats.

Use TM: 1-1 to aid in the discussion of this topic. Make sure all students clearly understand the functions of feed.

Objective 2: Identify the various feed types and their characteristics.

Anticipated Problem: What are the various feed types?

(PowerPoint Slide 10)

- II. A **feedstuff** is an ingredient used in making the feed for animals. **Feed** is what animals eat to get nutrients. Feedstuffs can be added to feed to provide flavor, color, or texture to increase palatability. **Palatability** is how well an animal likes a feed. A feed high in nutrients is of no benefit if the animal refuses to eat it. Feeds can be placed into three basic categories. They are:

(PowerPoint Slide 11)

- A. Roughages—Livestock feeds that contain more than 18 percent crude fiber when dry are called **roughages**. The type of feed is mostly leaves and tender stems of plants. These plants are also known as **forages**. Forages can be grouped into two general classes: legume roughages and nonlegume roughages.

(PowerPoint Slide 12)

1. A **legume** is a plant that can take nitrogen from the air. These plants have specialized root parts called **nodules**, which contain bacteria that aid in the process. All of the clovers, as well as alfalfa, soybeans, trefoil, lespedeza, peas, and beans are legumes.

(PowerPoint Slide 13)

2. **Nonlegume roughages** cannot use the nitrogen from the air. They are usually lower in protein than the legume roughages. Some examples of this type of roughage are: corn silage, fodders, bluegrass, timothy, redtop, bromegrass, orchard grass, fescue, and prairie grasses.

(PowerPoint Slide 14)

- B. Concentrates—Livestock feeds that contain less than 18 percent crude fiber when dry are called **concentrates**. This type of feedstuff is high in energy. Concentrates have more energy per pound than roughages. Higher producing animals need more nutrients from concentrates.

(PowerPoint Slide 15)

1. **High-energy concentrates** are feeds that contain less than 20 percent crude protein. Some common sources of high-energy concentrates are corn, wheat, sorghum, barley, rye, and oats.
2. **High-protein concentrates** are feeds that contain 20 percent or more protein. Examples of high-protein concentrates are soybean meal, cottonseed meal, and sunflower meal.

(PowerPoint Slides 16 and 17)

- C. Supplements—A **supplement** is a feed material high in a specific nutrient. Supplements are often added to feeds to increase protein content. Protein supplements can be divided into two groups based on the source of the protein.

1. Protein supplements that come from animals or animal by-products are called **animal proteins**. Common animal proteins are tankage, meat scraps, meat and bone meal, fish meal, and blood meal. **Tankage** is animal tissues and bones from animal slaughterhouses and rendering plants that are cooked, dried, and ground. Most animal proteins contain more than 47 percent crude protein. Animal proteins contain a more balanced amount of the essential amino acids than do the other type of protein supplements.
2. Protein supplements that come from plants are called **vegetable proteins**. Common vegetable proteins are soybean oil meal, peanut oil meal, and corn gluten feed. Most vegetable proteins contain less than 47 percent crude protein.

Use TM: 1-2 to aid in the discussion of this topic. Have students get into groups of 2-4 and have them develop a list of the different types of feed stuffs fed to beef and dairy cattle in the local area. Have the groups share their list with the rest of the class. Discuss how their list of feeds compare with those presented in Objective 2.

Objective 3: Explain how animals are fed.

Anticipated Problem: What are some ways to feed animals?

(PowerPoint Slide 18)

III. How and when animals are fed is an important component of animal production. This affects the growth and development of the animal. Animals need to consume the correct amount of the ration without overeating, which can cause health problems as well. There are two basic methods in which feed can be provided to animals: free access and scheduled feeding.

(PowerPoint Slide 19)

A. **Free access** or free choice is allowing animals to eat feed when they want feed. The feed is available to the animals at all times. This method is good for some species with some feedstuffs but not others. For example, cattle should not be fed concentrates free access because they will overeat and could possibly founder and die.

(PowerPoint Slide 20)

B. **Scheduled feeding** is providing feed at certain times of the day. Feeding times and regularity should be based on the needs of the animal or management practices.

Use TM: 1-3 to aid in the discussion of this topic by asking the students which type of method is used in their local area and which one would work best.

Review/Summary: Focus the review and summary of the lesson around the student learning objectives (**PowerPoint Slide 21**). Call on students to explain the content associated with the objectives.

Application: Application can involve the securing of actual types of feed that is fed to cattle so students can see the type of feed that is used. Visiting a local farmer who may raise some cattle to show the students what they feed their cattle would also help to reinforce the importance of providing appropriate feed for cattle.

Evaluation: Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. A sample written test is included.

Answers to Sample Test:

Matching

1. E
2. A
3. B
4. F
5. G
6. J
7. H
8. I
9. D
10. C

Fill-in-the-blank

1. 47 percent
2. Greater
3. Energy
4. Source
5. Overeat

Short Answer

See Objective 2 for scoring this question.

Meeting the Nutritional Needs of Animals

Name: _____

Matching: Match each word with the correct definition.

- | | |
|----------------------------------|----------------|
| a. Basal maintenance requirement | f. Roughages |
| b. Feedstuff | g. Tankage |
| c. Growth | h. Free access |
| d. Palatability | i. Feed |
| e. High-energy concentrates | j. Maintenance |

- _____ 1. Feeds that contain less than 20 percent crude protein.
- _____ 2. The amount of energy need by an animal for maintenance.
- _____ 3. An ingredient used in making the feed for animals.
- _____ 4. Livestock feeds that contain more than 18 percent crude fiber when dry.
- _____ 5. Animal tissues and bones from animal slaughterhouses and rendering plants that are cooked, dried, and ground.
- _____ 6. Keeping the body at a constant rate.
- _____ 7. Allowing animals to eat feed when they want.
- _____ 8. What animals eat to get nutrients.
- _____ 9. How well an animal likes a feed.
- _____ 10. The increase in size of muscles, bones, internal organs, and other part of the body.

Fill-in-the-blank: Complete the following statements.

1. Most vegetable proteins contain less than _____ crude protein.
2. The nutrient requirements for moderate to heavy milk production are _____ than the requirements during gestation.
3. Animal growth requires mostly _____ and smaller amounts of other nutrients.
4. Protein supplements can be divided into two groups based on the _____ of the protein.
5. Cattle cannot be fed concentrates free access because they will _____.

Short Answer: Answer the following question.

Compare and contrast roughages and concentrates.

FUNCTIONS OF FEED

- ✓ Maintenance
- ✓ Growth
- ✓ Reproduction
- ✓ Lactation
- ✓ Work

FEED TYPES

- Roughages
 - Legume
 - Nonlegume
- Concentrates
 - High-energy concentrates
 - High-protein concentrates
- Supplements
 - Animal proteins
 - Vegetable proteins

TM: 1-3

FEEDING METHODS

- ✓ Free access
- ✓ Scheduled feeding