

## **Unit B:** Understanding Animal Body Systems

### **Lesson 2:** 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.

**List of Resources:** The following resources may be useful in teaching this lesson:

Lee, Jasper S., et. al. *Introduction to Livestock and Companion Animals, 2<sup>nd</sup> Edition*.  
Danville, Illinois: Interstate Publishers, Inc. 2000. (Chapter 3)  
[www.admworld.com](http://www.admworld.com)  
[www.cargillanimalnutrition.com](http://www.cargillanimalnutrition.com)

### **List of Equipment, Tools, Supplies, and Facilities:**

Writing surface  
Projector  
PowerPoint Slides  
Copies of student lab sheets  
Examples of Feed material  
Posterboards

**Terms:** The following terms are presented in this lesson (**PowerPoint Slides 2 and 3**)

Animal proteins	High-energy concentrates
Basal maintenance requirement	High-protein concentrates
Concentrates	Lactation
Feed	Legume
Feedstuff	Maintenance
Fetus	Nodules
Forages	Non-legume roughages
Free access	
Gestation	
Growth	

**Interest Approach:** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

*Have samples of maize, soybean 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?

- 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 Slide 4)**
  - 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 the **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 5 and 6)**
  - 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. **(PowerPoint Slide 7) This is comparable to a teenagers diet.**
  - 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 Slides 8 and 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. **(PowerPoint Slide 10)**
  - 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. These animals require increased carbohydrates and fats. **(PowerPoint Slide 11)**

*\*\*After you have presented material, have students break into 5 groups. Assign each group one of the types of diets discussed and found on TM: 2-1. Give students time to develop a poster or bulletin board on their diet. This would include things like conditions when the animal is on this type of diet, the type and amount of feed that would be eaten, etc. Then, have each group share their project. These can also be used as a review for the test.*

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

**Anticipated Problem:** What are the various feed types?

- 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 12) If possible, have multiple types of feed on hand for students to look at.**
- 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 Slides 13 and 14)**
1. A **legume** is a plant that can take nitrogen from the air. These plants specialized root parts called **nodules**, contain bacteria that aid in this process. All of the clover (shaftal or berseem)s, as well as lucerne, soybeans, trefoil, lespedeza, peas, and beans are legumes. **(PowerPoint Slide 15)**
  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: foddors, bluegrass, timothy, redtop, bromegrass, orchard grass, fescue, and prairie grasses. **(PowerPoint Slide 16)**
- 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 17)**
1. **High-energy concentrates** are feeds that contain less than 20 percent crude protein. Some common sources of high-energy concentrates are maize, 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 18 and 19)**
- 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 that 47 percent crude protein. Animal proteins contain a more balanced amount of the essential amino acids than do the other type of protein supplements. **(PowerPoint Slide 20)**

2. Protein supplements that come from plants are called **vegetable proteins**. Common vegetable proteins are soybean oil meal, cottonseed oil meal, peanut oil meal, and maize gluten feed. Most vegetable proteins contain less than 47 percent crude protein.  
**(PowerPoint Slide 21)**

*\*\*Have students do a short research project on one type of feed from each category. For example, students could research the date and country of origin, amount produced in Afghanistan, what type of animals utilize this type of feed, etc.\*\**

**Objective 3:** Explain how animals are fed.

**Anticipated Problem:** What are some ways to feed animals?

- 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 22)**
  - A. **Free access** or free choice is allowing animals to eat feed when they want feed. The feed is available to the animal at all times. This method is good for some species and with some feedstuffs but not others. For example, poultry can be fed concentrates free access because they will not overeat. However, cattle should not be fed concentrates free access because they will overeat and could possibly founder and die. **(PowerPoint Slide 23)**
  - 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. **(PowerPoint Slide 24)**

*\*\*Share examples of farms in the area that use both types of feeding methods. Also, make a list on the board of the advantages and disadvantages of each method. If possible, take students to the farms to see these feeding operations.\*\**

**Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Have students create a short story over animal nutrients. Have specific guidelines to follow. **(PowerPoint Slide 25)**

**Evaluation:** Focus the evaluation of student achievement on mastery of the objectives stated in the lesson. Measure student performance on classroom participation, laboratory assignments, and written tests or quizzes.

## **Answers to Sample Test:**

### ***Part One: Matching***

1 = e, 2 = a, 3 = b, 4 = f, 5 = g, 6 = j, 7 = h, 8 = i, 9 = d, 10 = c

### ***Part Two: Completion***

1. 47 percent
2. greater
3. energy
4. source
5. overeat

### ***Part Three: Short Answer***

See Objective 2 in lesson for scoring.

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# Test

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**Part One: Matching**

*Instructions.* Match the term with the correct response. Write the letter of the term by the 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 state.
- \_\_\_\_\_ 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 the muscles, bones, internal organs, and other parts of the body.

**Part Two: Completion**

*Instructions.* Provide the word or words to 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. Poultry can be fed concentrates free access because they will not \_\_\_\_\_.

**Part Three: Short Answer**

*Instructions:* Provide information to answer the following question.

Compare and contrast roughages and concentrates.

# FUNCTIONS OF FEED

**Maintenance**

**Growth**

**Reproduction**

**Lactation**

**Work**