

Course	Agricultural Science I
Unit	Introduction to Animal Nutrition
Lesson	The Importance of Meeting Nutritional Needs
Estimated Time	90 minutes or 2-50 minute blocks

Student Outcome

Identify the importance of meeting the nutritional needs of animals.

Learning Objectives

1. Describe what a nutrient is.
2. Determine the six basic nutrients and describe their functions.
3. Describe the importance of meeting the nutritional needs of an animal.

Grade Level Expectations

SC/LO/2/D/09-11/b

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. PowerPoint Slides
 - ☐ PPt 1 – Nutrient Requirements for a Cow through Life Stages
2. Activity Sheets
 - ☐ AS 1 – Nutrient Recommendations (Instructor)
 - ☐ AS 1 – Nutrient Recommendations (Student)
3. *Introduction to Animal Nutrition (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1996.
4. *Introduction to Animal Nutrition Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ☐ Photos of different species of livestock with nutrient deficiencies

Supplemental Information

1. Internet Sites
 - ☐ Animal Science Publications. MU Extension. University of Missouri-Columbia. Accessed April 12, 2007, from <http://extension.missouri.edu/explore/agguides/ansci/>.
 - ☐ Livestock and Forages Publications. Cooperative Extension Service. University of Arkansas. Accessed June 1, 2007 from <http://www.aragriculture.org/livestock/publications.htm#Beef%20Cattle%20Nutrition>.
2. Print
 - ☐ Kellems, R. O., and D. C. Church. *Livestock Feeds and Feeding*. 5th ed. Upper Saddle River, NJ: Prentice Hall, 2002.
 - ☐ National Research Council. *Nutrient Requirements of Beef Cattle*. 7th Ed. Washington D.C.: National Academy Press, 2000.

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- ❑ National Research Council. *Nutrient Requirements of Dairy Cattle*. 7th Ed. Washington D.C.: National Academy Press, 2001.
 - ❑ National Research Council. *Nutrient Requirements of Horses*. 6th Ed. Washington D.C.: National Academy Press, 2007.
 - ❑ National Research Council. *Nutrient Requirements of Poultry*. 9th Ed. Washington D.C.: National Academy Press, 1994.
 - ❑ National Research Council. *Nutrient Requirements of Small Ruminants: Sheep, Goats, Cervids, and New World Camelids*. 1st Ed. Washington D.C.: National Academy Press, 2006.
 - ❑ National Research Council. *Nutrient Requirements of Swine*. 10th Ed. Washington D.C.: National Academy Press, 1998.
3. Electronic Media
- ❑ *Animal Nutrition Interactive PowerPoints*. University of Missouri-Columbia: Instructional Materials Laboratory, 2006.
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Interest Approach


Show pictures of various species with nutrient deficiencies. Ask the students if they can identify the problems.

Communicate the Learning Objectives

1. Describe what a nutrient is.
2. Determine the six basic nutrients and describe their functions.
3. Describe the importance of meeting the nutritional needs of an animal.

Instructor Directions	Content Outline
<p>Objective 1</p> <p><i>Ask what a nutrient is. Discuss the definition of nutrients and where they originate.</i></p> <p>NOTE: AS 1 may be used as an alternative format to teach objectives 1 and 2, or it can be completed after the discussion of these objectives.</p>	<p>Describe what a nutrient is.</p> <ol style="list-style-type: none">1. Elements or chemical compounds that support the life processes of an animal2. Allow animals to maintain bodily functions by entering cells of the body and fueling their growth and function3. Found in water, grain, roughage, and other food substances taken into the digestive system through the mouth
<p>Objective 2</p> <p><i>Ask what the six basic nutrients are. Describe the nutrients and their functions.</i></p>	<p>Determine the six basic nutrients and describe their functions.</p> <p>Water – contains hydrogen and oxygen</p> <ol style="list-style-type: none">1. Plays a role in biochemical reactions, including respiration, digestion, and assimilation2. Transports nutrients3. Transports wastes4. Regulates body temperature5. Gives the body its form <p>Proteins – contain carbon, hydrogen, oxygen, and nitrogen; may contain iron, phosphorus, and sulfur</p> <ol style="list-style-type: none">1. Develop and repair body organs and tissues like muscles, nerves, skin, hair, hooves, and feathers2. Used to produce milk, wool, and eggs3. Develop the fetus4. Generate some enzymes and hormones5. Form a part of DNA <p>Carbohydrates (sugar, starch, and fiber) – contain carbon, hydrogen, and oxygen</p> <ol style="list-style-type: none">1. Provide energy that powers muscle movement

Instructor Directions	Content Outline
	<p>required for exercise and essential functions, such as breathing, digestion, and beating of heart</p> <ol style="list-style-type: none"> 2. Produce body heat 3. Stored as body fat <p>Fats – contain carbon, nitrogen, and oxygen</p> <ol style="list-style-type: none"> 1. Function as a valuable energy source 2. Provide body heat 3. Carry some vitamins <p>Minerals – inorganic elements</p> <ol style="list-style-type: none"> 1. Supply materials for building skeleton and teeth 2. Form a part of body regulators, such as enzymes and hormones <p>Vitamins – organic substances that are fat- or water-soluble</p> <ol style="list-style-type: none"> 1. Regulate the digestion, absorption, and metabolism of nutrients 2. Regulate the formation of new cells 3. Regulate development of vision, bones, hair, feathers, skin, and muscles 4. Help protect against diseases 5. Develop and maintain the nervous system
<p>Objective 3</p> <p><i>Ask why animals might have different nutrient requirements at different times. Discuss those differences.</i></p> <p><input type="checkbox"/> PPt 1 – Nutrient Requirements for a Cow through Life Stages</p>	<p>Describe the importance of meeting the nutritional needs of an animal.</p> <p>Maintenance</p> <ol style="list-style-type: none"> 1. Must be met before any other nutrient needs are met 2. Keep the body functioning with no weight gain or loss and no production 3. Amount of feed needed to maintain the animal depends on body size <p>Lactation</p> <ol style="list-style-type: none"> 1. Fats and carbohydrates – supply energy vital for lactation 2. Protein 3. Water 4. Minerals – calcium and phosphorus needed during lactation 5. Vitamins – A, B-complex, and D (if indoors) are needed when a female is lactating

Instructor Directions	Content Outline
	<p>Conception and gestation</p> <ol style="list-style-type: none"> 1. Ensures good fetal growth, particularly for increased nutrient needs of fetus in last trimester 2. Needed because female requires additional nutrients to maintain itself and fetus <p>Growth and development</p> <ol style="list-style-type: none"> 1. Fats and carbohydrates – supply energy source 2. Protein – builds muscles and produces bone and connective tissues 3. Minerals – requires calcium and phosphorus for bone growth 4. Vitamins – requires higher quantities, especially D <p>Health – nutrients needed to carry out vital bodily functions; animal must be healthy to be most productive</p>
<p>Application:</p> <p> AS 1 – Nutrient Recommendations</p>	<p>Answers to AS 1</p> <p>Define the problem: What is causing the cows to be open and very thin?</p> <p>Possible Causes, Related Facts, and Accept/Reject Causes</p> <p>Water deficiency Components: Hydrogen and oxygen Functions: Plays a role in biochemical reactions, including respiration, digestion, and assimilation. Transports nutrients. Maintains body temperature. Gives body its form and carries body waste. Reject</p> <p>Protein deficiency Components: Essential and non-essential amino acids, containing carbon, hydrogen, oxygen, and nitrogen. Sometimes include iron, phosphorus, and sulfur. Functions: Develops and repairs body organs and tissues like muscles, nerves, skin, hair, hooves, and feathers. Produces milk, wool, and eggs. Develops the fetus and generates enzymes and hormones. Forms a part of DNA. Reject</p>

Instructor Directions	Content Outline
	<p>Carbohydrate Deficiency Components: Carbon, hydrogen, and oxygen in sugars, starches, and fiber Functions: Provides energy for bodily functions, such as breathing, digestion, and exercise. Produces body heat. Stored as body fat. Accept</p> <p>Fat deficiency Components: Same as carbohydrates but supplies 2.25 times more energy. Functions: Serves as an energy source. Provides body heat. Carries some vitamins. Reject</p> <p>Mineral deficiency Components: Inorganic elements that are macro- or micro-minerals. Macro-minerals are Ca, P, Na, K, Cl, Mg, and S. Micro-minerals are Fe, I, Cu, Co, Fl, Mn, Zn, Mo, Se. Functions: Supply materials for building skeleton and teeth. Form a part of body regulators, such as enzymes and hormones. Reject</p> <p>Vitamin deficiency Components: Organic substances that are either fat- or water-soluble. Fat-soluble vitamins are A, D, E, and K. Water-soluble vitamins are C and B-complex. Functions: Regulate digestion, absorption, and metabolism of nutrients. Regulate the development of vision, bone, hair, feathers, skin, and muscles. Regulate the formation of new cells, protect against diseases, and develop and maintain the nervous system. Reject</p> <p>Decision/Recommendation: A carbohydrate deficiency is the cause of the problem. Brandon's family should increase carbohydrate levels in the feed ration.</p>

Instructor Directions	Content Outline
	<p>Other activities</p> <ol style="list-style-type: none"> 1. Show students pictures of animals suffering from nutrient deficiencies to familiarize them with the effects of deficiencies.
Closure/Summary	<p>Nutrients are elements or chemical compounds that support the life processes of the animal. There are six basic nutrients – water, protein, carbohydrates, fats, vitamins, and minerals. Each nutrient has a specific function and may be important for health and maintenance, conception/ gestation, lactation, and growth/development.</p>
Evaluation: Quiz	<p>Answers:</p> <ol style="list-style-type: none"> 1. c 2. d 3. a 4. d 5. d 6. c 7. a 8. b 9. d 10. b 11. During gestation the female needs nutrients to maintain itself and the fetus. The last trimester requires the most nutrients since it is a period of great growth. The additional nutrient requirements for the female are equal to those of the young animal after birth. During lactation, the female needs protein, vitamins, minerals, fats, and carbohydrates. Protein and fats and carbohydrates are vital for producing milk. Minerals are needed for calcium and phosphorus. Vitamins A and B-complex are also needed, along with Vitamin D (if indoors). 12. Nutrients are important for animal health because they are needed to carry out vital bodily functions. An animal must be healthy in order to be at its most productive.