

Unit C: Poultry Management

Lesson 1: Nutrients for Maintenance, Growth and Reproduction

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

1. Describe nutrients required for proper poultry growth.
2. Describe the importance of the six nutrients in the poultry diet.

Recommended Teaching Time: 2 hours

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

- A PowerPoint has also been developed for use with this lesson plan
- <http://edis.ifas.ufl.edu/pdf/PS/PS03300.pdf>

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides

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

Carbohydrates
Fats
Minerals
Nutrients
Proteins
Vitamins
Water

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 the students create a list of everything they need to live and function throughout the day. Ask the students, “What are some things we need in order to live?” One of the

things they should have on their list is food so then ask, “What are the components of food that keep us healthy?” Lead the discussion into the nutrients they gain from food.

Summary of Content and Teaching Strategies

Objective 1: Describe nutrients required for proper poultry growth.

(PowerPoint Slide #3)

- I. **Nutrients** are the chemical substances found in feed materials that can be used, and are necessary, for the maintenance, growth, production, and health of the bird.
 - A. The nutrient needs of poultry are complex and vary by species, breed, age and sex of the bird.

(PowerPoint Slide #4)

- B. More than 40 specific chemical compounds or elements are nutrients that need to be present in the diet of the bird to support life.
 - 1. These materials are divided into six classifications: water, protein, carbohydrates, fats, vitamins, and minerals.
 - 2. A good diet must include all six of these nutrients in proper amounts.
 - 3. If any are insufficient then growth, reproduction, eggshell quality, egg production, egg size and other factors may be affected.

As a class, have the students list a food that provides each of the six nutrients. Now have the students determine what items would provide these nutrients to the diet of a bird. Sources will be discussed in the next objective.

Objective 2: Describe the importance of the six nutrients in the poultry diet.

(PowerPoint Slide #5)

- II. Each of the nutrients completes a specific task in the body.
 - A. **Water** is the most important nutrient required by poultry.
 - 1. Water is required for digestion and metabolism in poultry and makes up about 55-75% of the bird’s body and 65% of the egg.
 - 2. Water intake is approximately two times the intake of feed on a weight basis.
 - a. Water softens feed in the crop to prepare it for grinding in the gizzard.
 - 3. Many chemical reactions that take place in the bird’s body require water.
 - a. Blood is about 90% water and helps transport the other nutrients throughout the body as well as carry waste products outside the body.

(PowerPoint Slide #6)

- 4. Just as in humans, water cools the bird’s body through evaporation.
 - a. Birds do not have sweat glands so a major portion of their evaporative heat loss happens in the air sacs and lungs due to rapid respiration.
- 5. If medications are to be given to poultry, it is generally through the water.
 - a. Both the compound and water quantities should be carefully and accurately measured before giving them to the birds.

- b. After medication has been administered, the waterers should be emptied and rinsed.

(PowerPoint Slide #7)

B. Proteins

1. Proteins are made of amino acids.
 - a. The number and kind of amino acids will determine the type of protein.
2. The main products of poultry are composed of protein.
 - a. On a dry-weight basis, the body of a mature broiler is more than 65% protein and the contents of an egg are about 50% protein.

(PowerPoint Slide #8)

3. The body of a bird does not need the proteins so much as the amino acids.
 - a. Chicken tissues have the ability to make some of the required amino acids if the other amino acids are in adequate supply.
4. No single feed source can supply all of the amino acids so a mixture must be provided.
 - a. The main sources of proteins for poultry feeds are animal proteins such as fish meal and meat and bone meal; and plant proteins such as soybean meal and corn gluten meal.

(PowerPoint Slide #9)

C. Carbohydrates (carbs)

1. Carbs make up the largest portion of a poultry diet.
2. Carbs appear in greatest supply in plants in the form of sugars, starches or cellulose.
 - a. Starch is the form in which most plants store energy and it is the only complex carbohydrate which chickens can readily digest.
 - b. Chickens cannot digest cellulose.
3. Carbs are the major energy source for poultry but only ingredients containing starch, sucrose or simple sugars are efficient energy providers.
4. Corn and wheat are important sources of carbs in poultry diets.

(PowerPoint Slide #10)

D. Fats

1. Fats are an important energy source because they contain twice as much energy as any other feed ingredient.
2. Because of this trait, fats play an important role in starting and growing diets.
 - a. Fats make up more than 40% of the dry egg contents and 17% of the dry weight of a market broiler.

(PowerPoint Slide #11)

3. Fats are also important in the diet because they help in the absorption of certain vitamins.
4. Fats also provide essential fatty acids.
 - a. Essential fatty acids aid in membrane integrity, hormone synthesis, fertility, and hatchability.

(PowerPoint Slide #12)

E. Minerals

1. Minerals are divided into two classes: macrominerals (those needed in large amounts) and micro- or trace minerals.

- a. While trace minerals are only needed in small amounts, a deficiency in any of them could result in poor production.
- 2. Minerals complete many important functions in the poultry body.
 - a. It is most important in the formation of bones.
 - b. Laying hens also require calcium for eggshell formation
 - c. Minerals are needed for the formation of blood cells, blood clotting, enzyme activation, energy metabolism and muscle function.

(PowerPoint Slide #13)

- 3. Grains are low in minerals, so all poultry feeds contain supplemental sources.
 - a. Calcium, phosphorus and salt are needed in the greatest amounts.
- 4. Microminerals like iron, copper, zinc, manganese and iodine are supplied through trace mineral mixes.

(PowerPoint Slide #14)

F. Vitamins

- 1. There are 13 vitamins required by poultry that are classified as fat or water soluble.
 - a. Fat soluble vitamins are A, D, E and K.
 - b. Water soluble vitamins are thiamin, riboflavin, nicotinic acid, folic acid, biotin, pantothenic acid, pyridoxine, Vitamin B₁₂ and choline.
 - c. All these vitamins are essential for life.
- 2. The egg typically provides sufficient vitamins to supply needs of the developing embryo.
 - a. This is why eggs are a good source of vitamins for humans.

(PowerPoint Slide #15)

- 3. Vitamin A is needed for health and proper functioning of the skin and lining of the digestive, reproductive and respiratory tracts.
- 4. Vitamin D has an important role in bone formation and the metabolism of calcium and phosphorus.
- 5. Vitamin B metabolizes energy and other nutrients.

Ask the students to raise their hand if they can think of a source of each of the nutrients. Write the sources for the nutrients on the chalkboard or on the computer to show on the PowerPoint projector.

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 to determine which objectives need to be reviewed or re-taught with a different approach. Questions on **PowerPoint Slide #16** can also be used.

Application: Have the students use a textbook or the internet to research what nutrient deficiencies look like in poultry. Split the class into groups and assign them either a nutrient or one of the vitamins. They should research the sources of their nutrient and then create a poster or pamphlet showing what the deficiency symptoms are.

Evaluation: Evaluation should focus on student achievement of this lesson's objectives. A sample written test is attached.

Answers to Sample Test:

Matching:

1. F
2. E
3. C
4. B
5. A
6. D
7. G

Short Answer

1. Water
2. Fat soluble: A, D, E and K; Water soluble: thiamin, riboflavin, nicotinic acid, folic acid, biotin, pantothenic acid, pyridoxine, Vitamin B₁₂ and choline
3. Calcium

Sample Test

Name _____

Test

Unit C Lesson 1: Nutrients for Maintenance, Growth and Reproduction

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | | |
|------------------|-------------|-------------|--------------|
| a. Carbohydrates | b. Fats | c. Minerals | d. Nutrients |
| e. Proteins | f. Vitamins | g. Water | |

- _____ 1. There are 13 of these that are either fat or water soluble.
- _____ 2. These are formed by any combination of amino acids
- _____ 3. These are divided into macro and trace and provide for important body functions such as bone and eggshell formation.
- _____ 4. This is an important energy source and contains twice as much energy as any other feed ingredient.
- _____ 5. These make up the largest portion of a poultry diet and can be either starches, sugars or cellulose.
- _____ 6. The chemical substances found in feed materials that can be used, and are necessary, for the maintenance, growth, production, and health of the bird.
- _____ 7. This nutrient is the most important of all and makes up the large majority of the bird's body.

Part Two: Completion

Instructions. Provide the word or words to complete the following statement.

1. What is the most important nutrient in a bird's diet?

2. What vitamins are fat soluble? Which are water soluble?

3. What nutrient is needed for and important to the thickness of eggshells?