Setting Goals for Your 4-H Poultry Project

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
- How to set goals

ABOUT THEMSELVES:
- Importance of setting goals

Materials Needed:
- Paper and pencils
- Poultry Member Guide and Annual Report (MG-26)

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY:

Goals should indicate growth in the project as well as the member’s learning. Each year the goals should include at least one new skill to learn.

The MAP Worksheet defines the steps members must go through to set their goals for Level II.

Leader Notes

Have each member tell what goals he or she met or accomplished during the last year in this project. For example: raised 50 day-old chicks, gave a project talk on pigeons, etc.

Hand out Poultry Member Guide and Annual Report to each member.

Ask the members for some suggestions of things they might want to learn during the project year. Possible ideas might be suggested from lesson titles in Level II.

After they have developed a good list, have the members write their goals for the year on their MAP.

Have the members share their goals for the year with each other and the group. With these goals in mind, you can plan the project meetings so the members will be able to accomplish many of their goals.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What is one skill you learned from your poultry project last year?

2. What is the goal you have for your poultry project this year?

Process:
3. What problems did you have with your poultry project last year?

4. Why do you think you had those particular problems?

Generalize:
5. Does setting goals help you solve poultry problems?

6. Does setting goals help you solve your own problems?

Apply:
7. How will you use goal setting the next time you plan an activity?

REFERENCES:

Author:
James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Poultry Design Team

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4-Poultry, Level II
SETTING GOALS FOR YOUR 4-H POULTRY PROJECT
POULTRY, LEVEL II
Poultry Member Guide and Annual Report

Welcome to the 4-H Poultry Project! The purpose of this Poultry Member Guide and Annual Report is to help you journey through your Poultry Project. This guide will:
- Identify how to set goals on things to learn and begin your project,
- Identify 4-H learning opportunities,
- Identify 4-H recognition system,
- Provide you with an annual summary for your Kansas 4-H Poultry Project.

EXAMPLES OF GOALS ON THINGS TO LEARN
- Level I - Identify five poultry breeds
  - How to catch and handle a bird
- Level II - The parts on an egg
  - Types of feathers and their functions
- Level III - How to raise day-old chicks
  - Effect of light on egg production
- Level IV - Stages of chick embryo development
  - The potential of five poultry careers

In addition, there is a note to your parents/guardian at the bottom of this page, so they can help you with your poultry project.

LEARNING OPPORTUNITIES IN 4-H
- Attending project meetings with your friends
- Learning record-keeping skills
- Giving presentations at club and county 4-H Days, State Fair, school or civic groups
- Attending judging clinics and contests to observe, evaluate and make decisions
- Exhibiting at local, county, state or at American Poultry Association sanctioned shows

4-H RECOGNITION SYSTEM
4-H’s Recognition System is diverse and provides you with many learning opportunities:
- Participation: attending project meetings, helping others at project meetings, show and share at State Fair
- Progress toward goals: meeting the deadlines you set on your MAP sheet (see page 2)
- Standards of excellence: meeting a high percentage of learning goals for each level of the project
- Peer competition: judging and showmanship contests at poultry shows and fairs
- Team/cooperative efforts: community service activities

NOTES TO PARENTS/GUARDIANS:
The Poultry Project is one of several projects in the Animal Sciences Division of Kansas 4-H projects. It is an ideal project for both rural and urban youth, as well as all age groups. Poultry is a good beginning project because it requires minimal investment and teaches responsibility.

If your youth does not have a group leader, check with your local K-State Research and Extension office to see if your youth can participate in a neighboring club. If this is not available, you will need to act as the leader or helper. The K-State Research and Extension office has a copy of the “Poultry Leader’s Notebook” you may wish to use.

Insert all member handouts and activity sheets in the 4-H Record Book after this Poultry Member Guide and Annual Report. These records are a recording of what was done. List costs, hours spent, etc., on your journal page created in MAP STEP 8. Financial and performance records may be found in: Level II pages 65 to 70; Level III pages 21 to 26, 33 to 42, 53 to 60 and 74 to 84. Using records before the youth is capable of understanding the concept or doing the math computations is strongly discouraged!
HOW TO SET GOALS AND BEGIN YOUR PROJECT USING THE MEMBER ACHIEVEMENT PLAN—MAP

This is your Member Achievement Plan—MAP. This plan will help you begin to decide what goals, deadlines and energizers you want to use for the upcoming year.

MAP STEP 1
Identify as goals two things you would like to learn this year. Your leader will give you a list that might help you think about what you want to learn in your poultry project.

Goal 1: _____________________________________________________________________________

Goal 2: _____________________________________________________________________________

MAP STEP 2
After you identify each goal, let’s break them into steps. You can list 3 to 5 steps for each one of your goals.

<table>
<thead>
<tr>
<th>Steps for Goal 1:</th>
<th>MAP STEP 3</th>
<th>MAP STEP 4</th>
<th>MAP STEP 5</th>
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<td>5th</td>
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MAP STEP 3
Now that you’ve put Goal 1 into steps, go back and put a deadline next to each step. The deadline shows when you plan to complete the step. Every step should have a different deadline or date.

MAP STEP 4
Sometimes goals are hard to stick to. It takes a long time to see results. So as you complete a step and meet a deadline you need to give yourself a boost. Let’s call this boost an energizer or reinforcer. An energizer can be anything that you like and enjoy: going to a movie with a friend, talking on the phone, listening to a CD, taking your dog for a walk, eating a healthy snack, playing ball, etc.

What are other things you might use as energizers? List them here: _________________________________

Now, place one energizer for each step under the column marked, “Energizer.”

MAP STEP 5
When you’ve finished a step in your goal, place the date completed in the column marked, “Date Completed.”
MAP STEP 6
Now that you’ve identified your steps, deadlines and energizers, do the same for Goal 2.

Steps for Goal 2:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>MAP STEP 3</th>
<th>MAP STEP 4</th>
<th>MAP STEP 5</th>
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<td>1st</td>
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<td>5th</td>
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</table>

MAP STEP 7
Your goals, steps, deadlines and energizers are written. It’s time to share with one of your project members. When we talk to others about our goals, it helps us get a better idea of what we are going to do. Sometimes talking will help us get a better idea, so don’t worry about changing any part of your MAP if you want to. After you’ve explained your goal to a project friend, have them sign and date it in the space provided below.

Project Friend’s Signature ___________________________ Date __________________

Have your project leader sign below:

Project Leader’s Signature ___________________________ Date __________________

MAP STEP 8
Keep a journal of everything you do in the project to help you remember these experiences. (Create a page with these headings and add it to this record.)

<table>
<thead>
<tr>
<th>Date</th>
<th>What you did, learned, how you felt, costs, time spent, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 5</td>
<td>Attended a project meeting and learned parts of a bird. Now I know why a bird can fly so easily.</td>
</tr>
<tr>
<td>Mar. 6</td>
<td>Spent 10 hours building an incubator at a cost of $25.</td>
</tr>
</tbody>
</table>

MAP STEP 9
You’ve spent a whole year on your poultry project. You should have learned many new things. Take some time to think back and review your journal (STEP 8). Write one or two main things you have learned about poultry. What is something you have learned about yourself while studying poultry? (Add a page if you need more space.)
**Year _____**

**Kansas 4-H Poultry Summary**

<table>
<thead>
<tr>
<th>Name of project</th>
<th>Type of bird to exhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Years in 4-H</th>
</tr>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>4-H Club</th>
<th>County</th>
</tr>
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<tbody>
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</tr>
</tbody>
</table>

1. **Breed(s)**
2. Date project started __________
3. Date project ended __________
4. Total value or money received (column 2) $ __________
5. Value of birds at beginning (column 1) $ __________
6. Total feed cost $ __________
7. Other expenses (including birds bought during the year) $ __________
8. Total expenses (add lines 5, 6, 7) $ __________
9. Net income or loss from project (line 4 minus line 8) $ __________

10. A. Number of birds started ______________________
    B. Number of birds raised ______________________
    C. Number of birds that died ____________________

11. Percent death loss (line 10c divided by line 10a × 100) ____________________%

<table>
<thead>
<tr>
<th>Value of Birds at Beginning of 4-H Year</th>
<th>Value of Birds at Close of 4-H Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Value</td>
</tr>
<tr>
<td>Chickens</td>
<td>$</td>
</tr>
<tr>
<td>Turkeys</td>
<td>Turkeys</td>
</tr>
<tr>
<td>Pigeons</td>
<td>Pigeons</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>Waterfowl</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$</td>
</tr>
</tbody>
</table>

(column number) (1) (2)

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MG-26 (Revised) May 1998

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File code: 4-H Youth–2
Identifying Poultry Feed Ingredients

What Members Will Learn . . .

ABOUT THE PROJECT
- Six nutrient classes of feed ingredients
- Feed ingredient examples of each nutrient class

ABOUT THEMSELVES
- The nutrient classes included most in their diet
- The nutrient classes for their favorite foods

Materials Needed:
- Broiler starter feed sample (not pelleted or crumbled)
- Broiler starter feed sample (pelleted and crumbled)
- Activity Sheet 1, Poultry Feeds

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY:

The feed ingredients in a poultry ration are classified into one of six nutrient classes according to their function and chemical make-up. The classes are carbohydrates, fats, proteins, vitamins, minerals and water.

Carbohydrates are found in corn, milo, wheat and oats. You may find any one or all of these grains in a ration. Fats are used to supply energy and are usually used in the form of animal fats and vegetables oils. It is hard to see fat in a ration; however, the more fat that is used the less dusty the ration will be.

Proteins are used for muscle development and come from soybean meal, fish meal, meat by-products and corn gluten meal. Vitamins are found in alfalfa meal, yellow corn, and animal by-products. You should be able to find some of these ingredients in your ration. The best source of vitamins is a commercial vitamin premix and this will be hard to find in the ration. Minerals such as calcium and phosphorus are supplied by oyster shell, ground limestone and dicalcium phosphate. You may be able to see these products in the ration. Trace minerals are found in a commercial mineral premix and cannot be easily seen in the ration.

Many commercial feeds are pelleted by a pressure and steam process. This will alter the appearance of the ration. Crumbled rations are pellets that have been broken into small pieces. Pelleting or crumbling a ration may help the bird consume a more balanced diet and reduce feed wastage.

Leader Notes

Have two or three members examine a mixed broiler starter feed sample. Have them separate ingredients they can identify. List the ingredient and nutrient class on the Poultry Feed activity sheet. To see how processing can affect the structure of an ingredient, compare a ground ration to a crumbled or pelleted ration.
Have members do the Ingredient—Nutrient Class match on Activity Sheet 1, Poultry Feeds, as a review.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. How many different ingredients did you find?
2. How many nutrient classes were in your feed sample?

**Process:**
3. What were the differences between pelleted or crumbled samples?
4. What ingredients are grown in your community?

**Generalize:**
5. What nutrient classes are most common in your diet?
6. What foods do you eat that represent each nutrient class?

**Apply:**
7. How will your eating habits change, based on what you have learned in this lesson?

**GOING FURTHER:**
- Give a presentation to your class or other groups about the similarities of poultry feeds and human foods.

**REFERENCES:**

*Feeding the Small Flock of Poultry*, K-State Research & Extension C-392 (Revised)

**Author:**
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

**Reviewed by:**
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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10-Poultry, Level II
**IDENTIFYING POULTRY FEED INGREDIENTS**
**POULTRY, LEVEL II**
**Activity Sheet 1, Poultry Feeds**

List the feed ingredients and their nutrient class you were able to identify from the feed sample provided by your leader.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Nutrient Class</th>
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</tbody>
</table>

Match the following ingredients by drawing a line to the correct nutrient class.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Nutrient Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus</td>
<td>Carbohydrates</td>
</tr>
<tr>
<td>Corn</td>
<td>Fats</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>Proteins</td>
</tr>
<tr>
<td>B</td>
<td>Vitamins</td>
</tr>
<tr>
<td>Milo</td>
<td>Minerals</td>
</tr>
<tr>
<td>Alfalfa meal</td>
<td>Water</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
</tr>
<tr>
<td>Fish meal</td>
<td></td>
</tr>
<tr>
<td>Oats</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
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<td>$\text{H}_2\text{O}$</td>
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</tbody>
</table>
How to Read Feed Tags
_Poultry, Level II_

What Members Will Learn . . .

ABOUT THE PROJECT:
- Ingredients listed on a feed tag
- To identify types of information found on a feed tag
- To identify feed tag ingredients as sources of energy, protein, mineral or vitamin

ABOUT THEMSELVES:
- Nutrients needed for humans are similar to those needed for poultry
- It is their responsibility to eat a balanced diet

Materials Needed:
- Activity Sheet 2, Cereal Box Feed Tag Quiz
- Several examples of feed tags (you may have some of your own from purchased feed or these can be acquired from your local feed dealer)
- Pencils and paper
- Samples of some common feeds—you can ask members to bring a sample of what they feed with the tag from the feed sack (best if it is in a plastic bag or a jar)
- Hand out some sample feed tags
- Flip chart or chalkboard
- Several boxes of breakfast cereals

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:
Understanding the information written on the feed tag will help a member identify the ingredients of the specific feed, understand the nutrient requirements of a bird and eventually learn how to balance a ration.

During our entire life we must read labels to gather information that will be helpful in our decision-making process. Poultry feed tags have some of this type of information. Thus, it is a good practice to learn to read these labels.

Proper nutrition is the key to a successful poultry flock. In the same way, if we don’t get the proper nutrition by eating right, we can have health problems, our growth and development may be negatively affected, and we could die. Poultry also require proper nutrition for growth and development.

The main ingredients in poultry feeds are cereal grains (corn, wheat, barley and milo), oil meals (soybean, sunflower and cotton seed), fish

Leader Notes
Since a knowledge of feed constituents is necessary to this lesson, it is recommended that you conduct the lesson on feed ingredients before teaching this lesson.

Review the major concepts before starting this lesson.
meal, packing house by-products and dried-milk products. These ingredients are high in energy, low in fiber and highly digestible.

Regardless of feed type, all feeds include six basic nutrients: protein, carbohydrates, fats, minerals, vitamins and water. Knowing what combination of these nutrients your feed supplies is critical to a good feeding program.

**Protein** supplies the materials necessary to make body tissues. They are the building blocks of which chickens are made. Protein makes up muscle, internal organs, bones and blood. They also make up the skin and feathers of birds. If you feed more protein to your chickens than they need, the extra protein is used as energy for body functions such as heating or cooling the body, or producing eggs. Grains such as corn, wheat and milo supply part of the protein needed for growth. Protein supplements such as soybean meal are used to balance the ration.

**Carbohydrates** and **fats** supply energy. These nutrients are to poultry what gasoline is to a car. They provide energy for movement: walking, breathing, heartbeat and so on. These nutrients also help the bird produce heat to keep warm. Energy fed in excess of a bird’s requirements is stored as fat until the body needs it.

**Minerals** build bones and support other life functions. Calcium and phosphorous make up the largest percentage of the minerals needed by a bird. Minerals that are needed in only very small amounts are called *trace minerals*. Calcium and phosphorus are usually added to the ration for growth of bones and egg shell formation. Many producers use calcium carbonate, bone meal, oyster shells or dicalcium phosphate as feed additives to supply these necessary minerals. Sodium, chlorine and iodine are also critical minerals that are usually added in the form of iodized salt. Trace mineralized salt also has a number of the minor minerals needed for proper nutrition.

**Vitamins** are just as important as other feed nutrients, but they are needed in smaller amounts. Vitamin A is required for the health of eyes, nasal passages and lungs. For strong bones and healthy blood, vitamin D is needed. Vitamins are also required for other body functions. The bird’s body produces some vitamins while others must be added to the ration or absorbed from sunlight (like vitamin D3).

**Water** is considered to be the most important part of the bird’s diet. Moreover, it is the cheapest part of the diet, but it is often the most neglected part, too. A bird’s body is over two-thirds water and blood is over 90 percent water. Water is also necessary in digestion and for carrying food nutrients to the rest of the body. Water carries away waste products through the urine, functions as the body’s built-in cooling system, and lubricates the joints. Your bird can live longer without feed than without water.
In addition to the six nutrients, most rations also contain **feed additives**. These additives are primarily put in the feed to prevent or control diseases and parasites. The addition of additives to feed is regulated by the Food and Drug Administration.

Most states require that a feed tag be attached to each bag of feed. This tag usually contains the following minimum information: net weight; guaranteed analysis for crude protein, crude fat and crude fiber; a list of the ingredients; any active ingredients, such as drugs, and their function in the feed; instructions on feeding; and any warnings, such as to discontinue use five days before slaughter.

Have you ever thought about what goes into prepared poultry feeds? Let’s look at these samples of feed and the tag from each feed. The tag is an important tool for us—it tells us what is in the feed. When you study the samples, answer these questions:

- What kind of poultry is this feed meant for?
- What are some of the major ingredients in the feed?
- What are the sources of protein, energy, vitamins and minerals in this feed?
- Why are some feeds medicated?

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**

1. If you have feed tags (labels) from different companies, how do they differ and how are they alike?

2. Why are some grains not listed by name on the feed tag?

**Process:**

3. Can you tell from the feed tag if the feed contains the necessary nutrients?

4. Why is it important labels (tags) carry the contents of a package?

**Generalize:**

5. Why should you read the labels of the foods you purchase?

6. How can labels help you make wise food purchases in the supermarket?

**Apply:**

7. If your diet was restricted from using an ingredient such as salt or sodium, how would labels be useful to you?

Arrange the feed samples on a table so all of the members can gather around it, or divide the group into pairs and give each pair a feed sample and feed tag. This approach of providing a situation and asking your members to come up with answers or a solution is an effective way to teach this kind of material. After you have given the groups time to work on their questions, bring them together and let them tell the rest of the members what they have learned. Let them do the talking. Ask questions, but don’t give them the answers. Once all groups have had an opportunity to give their explanations, use a different feed tag to help them understand how to read the information that is included. Be sure to refer back to some of the good points each group made and also be sure to correct some inaccuracies they might have made.

Provide cereal boxes, the question sheet and pencils. Then briefly examine the cereal box labels together. Look for the requested information and when everyone is done, compare the cereals represented for nutritional value. Repeat this activity with a feed tag from the animal feed and compare it with the cereal box exercise.
GOING FURTHER:

• Arrange a trip to a local feed mill to see how the feed ingredients are weighed and mixed together to make the complete ration.
• Have the members collect samples of different ingredients that are found in a ration and find out as much as possible about the preparation of these ingredients before they are put into the ration.
• Divide the group into teams and have each team compare two feed tags from different species or different age groups within the same species. Have them identify what kind of feed it is.
• Have members make lists of essential nutrients found on the feed tag.
• Compare the ingredients in the ration with the ingredients or nutrients found in some of our human rations such as breakfast cereals.

REFERENCES:

Author:
Adapted from Animal Science Project Meeting Guides, Dr. Thomas D. Zurcher, University of Minnesota, 1981, by James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
HOW TO READ FEED TAGS
POULTRY, LEVEL II
Activity Sheet 2, Cereal Box/Feed Tag Quiz

Cereals are required to include nutrition information on the box. The label includes a list of ingredients that are listed in order from most to least. It also lists percentages of recommended daily allowances and the amounts of some nutrients per serving.

1. Name of cereal

2. Main ingredient

3. Serving size_________ servings per package_________

4. What does U.S. RDA mean?

5. Which vitamins are listed?

6. Does this cereal provide all of your daily needs (100%) for any of the nutrients? If so, which.

7. Which nutrients increase when milk is added?

8. Which nutrients are minerals?

9. Do the ingredients include BHA or BHT? If so, why?

10. Repeat this exercise using a poultry feed tag. Compare and discuss the answers.

Think Back:
What are the main feed ingredients for poultry and what nutrients do they provide?
Boney Birds
*Poultry, Level II*

What Members Will Learn . . .

ABOUT THE PROJECT:
- The major parts of a bird’s skeleton
- The function of three to five major skeletal parts
- How a bird’s skeleton is adapted for flight

ABOUT THEMSELVES:
- Boney parts birds and mammals have in common
- How knowledge of birds helped humans develop airplanes

Materials Needed:
- Large sheet of paper
- Marking pens
- Activity Sheet 3, Bird Skeleton
- Leader’s Key, Activity Sheet 3, Bird Skeleton

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

What are some observations you can make when you see a chicken or other type of bird? What are some skeletal similarities you see between birds and mammals? What are some differences?

Poultry are bipeds. That means they stand and walk on two legs, just as humans do. What other animals walk on two legs? If we look at the skeleton of a bird we would see it is similar to that of most mammals (with a few exceptions). The first difference is a bird has a pair of extra bones in the shoulder area, called the caracoids. These bones allow the wings to move and provide additional support for the wings. The second difference is in the spine. The neck bones, or cervical vertebrae, which connect the body to the head are formed in an S-shape. This S-shape acts as a spring when a bird lands on the ground and provides a cushion to the head. The third difference between the skeletal structure of a bird and mammals is the back vertebrae are very strong because they are fused together, providing a strong support for the wings.

The skeletal system is closely connected to the respiratory system. Some of the bird’s bones are hollow and are connected to the respiratory system. Those bones serve as a reservoir for air. This makes the bird lightweight for flight. These hollow bones are called pneumatic bones. Pneumatic bones in the bird include the skull, humerus, keel, clavicle and lumbar and sacral vertebrae. If necessary, a bird could breathe through an open bone if its air supply was cut off to its trachea, or windpipe.

**Leader Notes**

Write down their answers on a chalkboard or large sheet of paper. Have members discuss structural similarities and differences between poultry and mammals.

List and discuss three main skeletal differences of birds as compared to mammals.
Other functions of the skeleton include attachment of muscles, protection of the vital organs and a source of red blood cells. Egg-laying hens also have medullary bones. The marrow cavity of these bones, which include the femur, tibia, sternum, ribs and scapula, contain the honeycomb lacing of bone spicules or tiny spikes, that provide a source of calcium which the hen uses to calcify shells. This type of bone is usually absent in males or nonlaying females.

The mandible and incisive bones make up the beak of the chicken and turkey or the bill in waterfowl. The shape of the beak or bill is influenced by the bird’s natural diet. Chickens and turkeys have a long, pointed beak which allows them to obtain their natural diet of seeds and insects. The wing of a bird consists of the humerus, radius, ulna, metacarpus and phalanges bones. The phalanges and metacarpus bones are similar to the fingers and wrist bones in humans. The clavicle is the well-known wish bone. The sternum or breast bone is the largest bone in the fowl. Waterfowl have a much larger and flatter sternum than chickens and turkeys, as it provides protection to the vital organs when waterfowl land on water. The vertebrae from the base of the neck to the base of the tail are fused with the ilium and ischium to provide rigidity to the skeleton for flight. Because the egg passes between the two pubic bones which are located below the vent of the bird, the distance between them is used as an indicator of egg production. The femur, fibula, tibia and metatarsus bones make up the leg of the bird. The metatarsus bones are comparable to the ankle bones in humans. Most breeds or varieties of chickens and turkeys have four toes, a few have five. The shape and structure of the feet and toes of birds depends on their natural diet. For example, grain eaters, such as chickens and turkeys, have long sharp toes for scratching the soil for seeds and insects. Waterfowl, such as ducks and geese, have webbed feet for paddling in the water. Most species of birds have seven pair of ribs. The ribs are flexible because they expand and contract as the bird breathes.

Let’s take a look at the bird’s skeleton and see how many parts we can identify. How many bones do you think are the same as yours?

**DIAGLOGUE FOR CRITICAL THINKING:**
**Share:**
1. What bird skeleton parts did you already know? Why?
2. What bird skeleton parts were hard to identify? Why?

**Process:**
3. What are pneumatic bones and what do they do?
4. What are medullary bones? List some.
5. How is a bird’s skeleton adapted for landing purposes?
Generalize:
6. How does the skeletal structure of a bird differ from that of mammals?

Apply:
7. What bird characteristics do you think were important in helping to develop the airplane?
8. How will what you learned from this lesson help you in the future?

GOING FURTHER:
• Make a poster of a bird’s skeleton and give a talk at your next club, project meeting or in your class at school.
• Save the bones from the chicken your family eats and identify them.

REFERENCES:
Poultry Science, Ensminger
Poultry Meat and Egg Production, Parkhurst

Author:
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
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BONEY BIRDS
POULTRY, LEVEL II
Activity Sheet 3, Bird Skeleton

Draw a line from the name of the bone to the correct place on the diagram.

- skull
- sternum
- coracoid
- clavicle
- cervical vertebrae
- mandible
- incisive
- rib
- phalanges
- metacarpus
- ulna
- radius
- humerus
- scapula
- ilium
- tail bone
- pubic bone
- metatarsus
- tibia
- femur
BONEY BIRDS
POULTRY, LEVEL II
Leader’s Key, Activity Sheet 3, Bird Skeleton

Draw a line from the name of the bone to the correct place on the diagram.
A Chicken’s Digestive System

What Members Will Learn . . .

ABOUT THE PROJECT:
• The four functions of a chicken’s digestive system
• To identify at least eight parts of the chicken’s digestive system
• The eight functions of each major part of the digestive tract

ABOUT THEMSELVES:
• The importance of their digestive system
• How food choices affect their digestive system

Materials Needed:
• Chalkboard or newsprint
• Markers
• Activity Sheet 4, Digestive Tract
• Leader’s Key, Activity Sheet 4, Digestive Tract
• Activity Sheet 5, Digestive System Word Search
• Leader’s Key, Activity Sheet 5, Digestive System Word Search

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

The digestive system consists of the parts of the body which are involved in the chewing and digesting of feed. This system is also responsible for moving the digested food particles through the chicken’s body and absorbing the products of digestion. Chickens have certain special organs that are not found in other animals.

Functions of the chicken’s digestive system are to get the food into its mouth with its beak or bill (prehension), storage of the food (in the crop) until it can be digested, physical breaking down of the food particles by the gizzard (mastication), chemical breaking down of the food nutrients into the simple forms (digestion), passage of the simple forms across the intestinal wall to the blood vessels (absorption) and storage and elimination of the wastes.

The structure and length of the digestive tract of an organism is determined by what type of food it eats. Meat and grain eaters (omnivores), such as birds, dogs, cats and humans, have shorter digestive tracts than cattle or sheep, which are herbivores, animals that eat complex plant materials. For example, the length of the bird’s digestive tract is approximately four times longer than its body. The digestive tract of a sheep measures approximately 27 times its body length. The longer tract is necessary to allow a longer time for digestion to take place.
Chickens, like humans, are a monogastric, which means they have a simple stomach. Cattle and sheep are polygastric, or ruminants, because they have four stomachs.

The major parts of a chicken’s digestive system and their functions are:

1. **Mouth**—The prehension or acquiring of food by birds differs from mammals because birds do not have teeth, lips or cheeks. The shape of the bird’s beak or bill is related to the type of food it eats (for example chickens and turkeys have pointed beaks because they are grain eaters.) A chicken’s tongue is pointed with barb-like projections on the back and hard projections on the roof of the mouth, which serve to force the food toward the gullet (or esophagus) of the bird.

2. **Gullet (or esophagus)**—The gullet is a flexible tube, next to the windpipe, which connects the mouth to the crop. (Like a human’s throat.)

3. **Crop**—This is the first storage site for the feed that is eaten. The crop stores and softens the food. The time food spends in the crop depends on the type of food and how much food is in the gizzard. Whole grain is kept in the crop longer than ground grain.

4. **Glandular Stomach**—The glandular stomach or proventriculus is the segment which contains cells that secrete, or give out, digestive juices that start the chemical breakdown of the food particles.

5. **Gizzard**—The gizzard serves as the bird’s teeth to grind the food. It is composed of a thick, powerful muscle and is lined with a thick, tough lining. Birds eat small rocks or pebbles called grit that they use to grind the food.

6. **Small Intestine**—The small intestine is a section that extends from the gizzard to the junction with two blind pouches, called the ceca. The first section is the duodenal loop that surrounds the pancreas. The pancreas secretes insulin which regulates how the body uses sugar. It also secretes pancreatic juice that aids in the digestion of fat, starches and protein. The main functions of the small intestine are secretion of digestive juices and absorption of nutrients.

7. **Ceca**—The two ceca, sometimes called blind guts, mark the junction of the small and large intestines. Even though a chicken can live without its ceca, some digestion takes place here. The ceca is a favorite site for multiplication of parasites such as cecal worms and protozoa, like the blackhead organism.

8. **Large Intestine**—The large intestine is very short in birds and its major functions are to reabsorb water and store waste materials.

Hand out Activity Sheet 4, Digestive Tract. See how many of the parts members can label in pencil. Then, as you use the text to discuss the parts, let members correct their sheets, or take up the sheets and give back them after discussion as a post-test.
9. **Cloaca**—The cloaca is an enlarged part found where the large intestine joins the vent. Feces from the large intestine are passed out of the body through the vent. This is a common passageway for the ends of both the reproductive and digestive tracts.

10. **Liver**—The liver is an accessory organ to the digestive tract because it secretes bile, filters the blood and stores excess carbohydrates. The green colored **gall bladder** is embedded in the liver tissue. (The chicken has a gall bladder, but some other birds do not.) The liver has two bile ducts that carry the bile from the liver to the intestines. The right duct is enlarged to form the gall bladder, through which most of the bile passes and is temporarily stored. The **spleen** is a dark red organ next to the liver. Its main function is the destruction of red blood cells. The excretion of water and metabolic waste occurs largely through the kidneys. These wastes are filtered out as blood passes through the **kidneys**. The wastes are excreted as a whitish pasty substance that gives bird droppings their characteristic white color.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**

1. What was the easiest and most difficult part of the digestive system to understand? Why?

**Process:**

2. What are the four basic functions of a bird’s digestive system?

3. How does a bird make food particles smaller to prepare them for digestion?

**Generalize:**

4. What conclusions can be made about a monogastric digestive system? (Efficiency, Capacity, Problems?)

**Apply:**

5. How will understanding your digestive system help you eat the right foods?

**GOING FURTHER:**

- Make a poster of the digestive system of a chicken and prepare a talk to present to your next club meeting or your school classroom.
- Visit a feed store and compare the composition of poultry feed with livestock feed fed to cattle and sheep.
- Help process a fryer and identify the digestive tract parts. Observe or take notes about the contents of each part and how it changes as digestion occurs.

Use Activity Sheet 5, Digestive System Word Search, as a final review of terms.
REFERENCES:
Poultry Meat and Egg Production, Parkhurst
Poultry Science, Ensminger
Poultry Science, Adams

Author:
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

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28-Poultry, Level II
CHICKEN’S DIGESTIVE SYSTEM
POULTRY, LEVEL II
Activity Sheet 4, Digestive Tract

Match name with number.

___Beak and mouth
___Ceca
___Cloaca
___Crop
___Duodenal loop
___Gall bladder
___Gizzard
___Glandular stomach
___Gullet
___Kidney
___Large intestine
___Liver
___Pancreas
___Small intestine
___Spleen
___Ureter
CHICKEN’S DIGESTIVE SYSTEM
POULTRY, LEVEL II
Leader’s Key, Activity Sheet 4, Digestive Tract

Match name and number.

1. Beak and mouth
2. Gullet
3. Crop
4. Glandular stomach
5. Gizzard
6. Liver
7. Gall bladder
8. Spleen
9. Duodenal loop
10. Pancreas
11. Small intestine
12. Ceca
13. Large intestine
14. Kidney
15. Ureter
16. Cloaca
Prehension
Digestion
Monogastric
Ceca
Small intestine
Gizzard
Crop
Grit
Omnivore
Liver
Bile
Gall bladder

Find the hidden words in the puzzle.

prehension
digestion
monogastric
ceca
small intestine
gizzard
crop
grit
omnivore
liver
bile
gall bladder

O M N I V O R E J D N O O
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**CHICKEN’S DIGESTIVE SYSTEM**
**POULTRY, LEVEL II**
Leader’s Key, Activity Sheet 5, Digestive System Word Search

Find the hidden words in the puzzle.

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32-Poultry, Level II
Poultry Disease Prevention

What Members Will Learn . . .

ABOUT THE PROJECT:
- Five major areas of a good disease prevention program
- Most common poultry disease to prevent

ABOUT THEMSELVES:
- Importance of a human disease prevention program

Materials Needed:
- Pencil and paper
- Flip chart and markers

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Disease prevention in poultry production is much more economical and effective than treating diseases with medications. Although the medication may relieve the problem, much of the damage is already done, such as retarded growth, reduced egg or meat quality and increased costs of production. However, with some simple planning steps, most diseases can readily be prevented.

Housing
First, plan the housing of the birds to provide good ventilation and adequate heat, feeder and waterer space. Overcrowding must be avoided as it is a major source of stress and disease in a flock. Keep different species in separate housing. If possible, also raise the age groups separately. Make sure the buildings or pens have good drainage, as excess moisture results in many disease problems. Construct the buildings or pens to be predator and wild bird proof.

Nutrition
It is best to use commercially available poultry feeds appropriate for the species, age and usage of the flock. Store feed in cool, dry, rodent-proof containers.

Sanitation
Good common-sense practices such as daily cleaning of waterers, removal of wet litter spots and frequent removal of manure should be practiced.

Daily Bird Care
Examine birds daily and weigh some individuals weekly. Remove sick and dead birds daily. Place sick birds in a pen far removed from the rest of the flock. Cull abnormal or lame birds.
Buying Birds
Be sure to buy new stock from a hatchery or breeding source that is a participant of the National Poultry Improvement Plan. This will assure that the birds will be free from several of the egg-transmitted diseases such as Salmonella pullorum and the mycoplasmas. Have a quarantine pen available for any new arrivals and keep them there for three weeks before introducing them to the rest of the flock.

Traffic Control
People are the main spreaders of diseases to and from poultry flocks. Be sure to screen all visitors prior to their coming into contact with the birds. Ask that they not come into contact with other birds on the day of the visit. Give them boots to wear before entering the poultry pens.

Vaccination
Unless you have specific disease problems, it is best not to use vaccines. Most farms have coccidiosis. Therefore, preventative medication is necessary in the feed.

Medication
Before using medication, be sure you have a diagnosis of the problem by your veterinarian. Always follow label instructions exactly.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What are some common disease prevention methods for poultry?
2. Which prevention method was most difficult to understand? Why?

Process:
3. What are some common poultry health problems?
4. What are three ways to prevent the most common poultry health problems?

Generalize:
5. What are some common human disease preventions?
6. How important are human disease prevention programs? (Such as immunization for mumps, measles, small pox, polio, etc.)

Apply:
7. How will what you learned about disease prevention in this lesson help you avoid and prevent disease in the future?
GOING FURTHER:
• Design a disease prevention program for your family.
• Give a presentation to civic groups about your poultry disease prevention program or the importance of a community disease prevention program.

REFERENCES:
Author:
Dr. Eva Wallner-Pendleton, Avian Extension Veterinarian, University of Nebraska; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
Poultry can become ill from a number of diseases. These diseases are frequently classified according to their cause. Diseases can be caused by viruses, bacteria, parasites such as mites or worms, poor nutrition or toxic substances. The most common of these diseases will be discussed.

**Parasites that live on skin and feathers**
Mites and lice frequently live on the skin of poultry. Lice are true insects, while mites are related to spiders. Mites and lice are irritating to the birds, and frequently spread diseases among the flock. A flock may become infected through contact with other poultry or wild birds.

Diagnosing lice or mite infection involves careful inspection of each bird’s feathers and skin. Mites frequently like to congregate under the bird’s tail. Lice can be anywhere on the skin. Lice will place masses of eggs at the base of the feathers. Some mites feed only at night, then leave the bird during the day, so check the coop at night with a flashlight.

Treatment of these external parasites involves spraying or dusting with an insecticide. Treatment of the birds with flea powders approved for cats is safe and effective. Application of sprays or powders must be repeated at least two or three times, 10 days apart to eliminate the parasites. From then on, the birds should be inspected regularly, at least every two weeks for reoccurrence of these pests.

**Internal parasites**
Poultry are frequently infected with a tiny, single celled organism called coccidiosis. These parasites live in the intestinal tract of birds, where they can cause much damage. Infected birds excrete the eggs of this parasite (called oocysts) in their droppings.

List each parasite or disease on chalkboard or flip chart as it is discussed. Ask members to give ideas first. Describe symptoms or show a bird with symptoms and ask members to suggest treatments.
Other birds become infected when they eat the eggs while feeding on the ground.

Signs of coccidiosis include diarrhea, which is often blood-tinged. The sick birds begin to act cold, huddle together and fluff their feathers.

Diagnosis is achieved by identifying the parasite eggs in the droppings under a microscope.

Coccidiosis medication is given in the drinking water or the feed to stop the disease. Prevention of coccidiosis is primarily by keeping conditions in the poultry house dry and manure free.

**Nutritional Diseases**

Nutritional diseases are common in small poultry flocks. Although most commercially available feeds are nutritionally balanced, each type of feed is specifically designed for a given species of poultry for a specific purpose. For instance, starter rations are designed for baby chicks while lay rations are formulated for birds in egg production. It is very important to adhere to the diet formulated for the species and age group.

Sometimes even birds on commercial rations may suffer from a deficiency of a nutrient if the feed has been mishandled, i.e. allowed to get wet, or improperly stored. Commercial feeds occasionally get diluted with added grain. This results in malnutrition, obesity and poor production. To prevent malnutrition; scraps, grain, and foraging should not constitute more than 10 percent of the poultry diet.

Typical signs of malnutrition may include:
- poor, dull feathering and scaly skin,
- soft and curved leg and keel bones,
- high percentage of runts and poor-doers,
- poor egg production, soft shelled eggs
- poor egg fertility and hatchability.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What poultry diseases have your birds experienced? Why?

2. What poultry parasites have you seen? Where or when?

**Process:**
3. What are three causes of poultry diseases?

4. What are three types of parasites?
Generalize:
5. Has your school ever experienced an outbreak of lice or other parasite? How was the problem handled?

Apply:
6. How can you help prevent parasite infestations?

GOING FURTHER:
• Visit a veterinarian to see parasite samples.
• Check for parasites in your flock.
• Check feed tags at a feed store to see what medications are added for parasite or disease control.

REFERENCES:
Suggested Treatments for Diseases and Internal Parasites of Poultry, (L765) K-State Research and Extension

Author:
Dr. Eva Wallner-Pendleton, Avian Extension Veterinarian, University of Nebraska; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

Think Back:
Discuss with your group and record your thoughts about any part of a bird’s structure or digestive system that might cause or prevent a disease. (Note: Recordings should be added to record book. Extra sheets with this discussion could be made for each member.)
Cracking Up—What’s in an Egg?

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• The major parts of an egg
• The functions of the parts of an egg
• How an egg loses quality

ABOUT THEMSELVES:
• Their feelings about learning by doing

Materials Needed:
• Several fresh eggs (both brown and white if possible)
• Clear glass plate
• Hot tap water
• Large clear water glass or fruit jar
• Sharp knife
• Member Handout 1, Parts of an Egg

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

The egg is one of nature’s most complete foods. The reason for this high nutritional value is that the developing chick’s only source of food during its stay inside the egg is the nutrients present in the egg. This explains the perfect balance of the six nutrients essential for growth.

The egg is made up of many complex parts. An understanding of these parts, how they are formed and their functions is very helpful if you plan to conduct experiments on incubation, embryonic development and brooding, or want to learn about how to determine the quality of eggs that you buy.

The Shell
Looking at the egg from the outside, we first see the shell. It is a hard, protective covering that is composed primarily of calcium carbonate. Its function is to provide protection to the egg contents and to provide certain minerals to the developing embryo. The shell is very porous. A normal egg shell has 6,000 to 8,000 pores (holes) throughout the shell. These pores permit the transfer of oxygen, carbon dioxide and water in and out of the shell for the developing embryo. Shell color is a genetic trait. The White Leghorn, the most popular egg-type chicken in the United States, lays white-shelled eggs, while the American breeds, such as the Rhode Island Red, Plymouth Rock and New Hampshire, lay brown-shelled eggs. Shell color has no influence on the nutritional content of an egg. The shape and size of an egg are influenced by genetics, nutrition and the environment of the hen.

Leader Notes

Give each member a fresh egg and have each of them describe the appearance of the outer shell. List their comments on a chalkboard or flip chart.
Shell Membranes
On the inner surface of the shell are two soft shell membranes which surround the white and yolk of the egg. These membranes provide a barrier against the invasion of microorganisms into the liquid of the egg. Note the air cell that is found at the large end of the egg between the two shell membranes. A newly laid egg has a very small air cell. As the egg cools at time of laying from a temperature of 107°F to the atmospheric temperature, the contents contract, creating a vacuum which draws air through the larger, more porous end of the shell. As a result, the air cell is formed at the large end of the egg. As the egg ages, the loss of moisture increases the size of the air cell. Storing eggs in a warm, dry environment speeds up this loss of moisture. The depth of the air cell of an egg is the major factor in determining its quality; the deeper the air cell, the lower the quality.

The Albumen (White) and Yolk
Note the two white cords that are attached to the yolk and imbedded in the thick white. These two cords, called the chalaza, hold the yoke in the center of the egg. These cords disappear as the egg ages.

The thick white of the egg contains primarily water and protein. The yolk contains large amounts of fat, vitamins and minerals that are essential for normal embryonic development. Note the white spot on the surface of the egg. This is the germ spot or living part of a fertilized egg.

As an egg ages after it is laid, physical and chemical changes take place. Moisture is lost from the white and yolk, which causes the air cell to increase in depth. The thick white turns to thin white. The yolk absorbs water from the white, which stretches the yolk sac, resulting in a large flat yolk. These chemical and physical changes do not affect the nutritional content of the egg, but do affect the functional and physical appearance of the cooked egg.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What does the shell of an egg feel like?
2. How many egg parts were you able to identify?

Process:
3. What are the four major parts of an egg?
4. Why do various species of birds have different colored egg shells?
Generalize:
5. Cracking an egg and examining the parts is a delicate procedure. What did you learn about yourself from this activity?

6. What is your opinion about learning by doing? Why?

Apply:
7. What would you do differently next time? Why?

8. How can you use the learning by doing model in other non 4-H activities?

GOING FURTHER:
• Study what causes color variations in egg yolks.
• Study what affects nutritional differences in eggs.

REFERENCES:
*Incubating Chicken Eggs*, Kansas State University 4-H 138c

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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CRACKING UP—WHAT’S IN AN EGG?
POULTRY, LEVEL II
Member Handout 1, Parts of an Egg

The parts of an egg. (From the Egg Grading Manual, USDA Agricultural Handbook No. 75, July 1961.)
Making and Using an Egg Candler

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• How to construct a simple, inexpensive candler
• The methods and reasons for candling eggs
• The differences between a fertile and non-fertile egg
• The differences in various qualities of eggs

ABOUT THEMSELVES:
• Their feelings about their ability to make and use an egg candler
• Their feelings about being able to use technology to plan for the future

Materials Needed:
• An oatmeal box, shoebox or tin can
• An extension cord and a 60-watt bulb
• A dark room
• Fertile and non-fertile eggs and high and low quality eggs (obtain about one week before the meeting)
• Member Handout 2, Wood Box Egg Candler, Candled Eggs

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

You can construct a simple, inexpensive candler from an oatmeal box, a tin can or wood box as shown in the Member Handout 2. Cut a 1-inch hole in the side of the box or can. Obtain an extension cord and mount a 60-watt bulb inside the candler.

Candling eggs consists of holding the eggs in front of a bright light in a darkened room. Eggs can be candled individually by holding the large end in front of the light, rotating gently and observing the contents illuminated by the light rays. During candling, the following characteristics can be observed: the presence or absence of embryonic development and those characteristics that indicate the interior and exterior quality of an egg. An infertile (market egg) will have a well-defined yolk shadow, air sac, and chalaza (cord-like attachment of yolk to the albumen or egg white). A living embryo will have a small dark spot (on the yolk) with a distinct network of blood vessels coming from the spot. A dead germ will have a dark spot on the yolk without the clear network of blood vessels.

Eggs purchased in the supermarket have been mass candled, which involved passing a large number of eggs at one time over a bright light. Hold the large end of the egg up to the candling light at a 45-degree angle.

Leader Notes

Have members construct an egg candler.

Refer to Member Handout 2, Wood Box Egg Candler, Candled Eggs.

Several days prior to the meeting, purchase three to four eggs per member at the store. Place half the eggs in the refrigerator and store the other half at room temperature. Have members candle the eggs and note differences in the air cell depth, yolk movement and prominence of the yolk shadow of the eggs.
This allows you to observe the air cell, the yolk and the white. Hold the egg between your thumb and first two fingers. Then, by turning your wrist quickly, you can gently cause the inside of the egg to twirl.

Observe the depth of the air cell, which is the distance from its top to its bottom when the egg is held air cell up. In a high quality (grade AA) egg, the air cell is small, not more than \( \frac{1}{8} \)–inch deep. As an egg declines in quality, the air cell increases in depth from evaporation of moisture from the egg. A grade A egg can have an air cell depth up to \( \frac{3}{16} \)–inch. An egg with an air cell depth greater than \( \frac{3}{16} \)–inch is grade B.

A high quality egg’s yolk moves only slightly when twirled because the yolk is surrounded by a dense layer of thick white. As the egg ages or deteriorates in quality, the white thins and the yolk tends to move more freely and approaches the shell more closely; then the yolk is more visible and darker.

The condition of the white influences the behavior of the yolk when the egg is twirled. Blood or meat spots become apparent when the egg is candled. Eggs with blood or meat spots over \( \frac{1}{8} \)–inch in diameter are classified as inedible. Eggs with spots smaller than \( \frac{1}{8} \)–inch are classified as grade B. When determining the grade of an egg by candling, the lowest quality factor will determine the grade.

Candling can be done as early as three days after the start of incubation to determine fertility, but is more accurate after seven days, particularly with brown-shelled eggs. A fertile egg will have a small dark spot in the center of the egg with a network of blood vessels branching out. An infertile egg shows no evidence of development and has the appearance of a market egg when candled. Early dead germs (death prior to appearance of blood) are difficult to distinguish by candling. Eggs showing rings, streaks of blood or tissue adhering to the shell contain embryos that have died early in the incubation period.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What was the first impression of the egg candler you made?
2. What was the easiest part of the egg to see? Why?

Process:
3. What problems did you have when candling eggs?
4. How were you able to determine an infertile egg from a fertile egg?

Generalize:
5. What other instruments allow you to see inside or through something? (Examples: Ultrasound, X-ray)
Apply:
6. How can the use of technology help you plan for the future?
7. What other planning methods are useful? Why?

GOING FURTHER:
- Visit a hatchery or egg processing plant and observe mass candling of eggs.
- Demonstrate your candler to your class at school or arrange to demonstrate it at a grocery store.

REFERENCES:
_Poultry Judging_, Nebraska Extension 4-H 92

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
MAKING AND USING AN EGG CANDLER
POULTRY, LEVEL II
Member Handout 2, Wood Box Egg Candler, Candled Eggs

1" HOLE WITH BEVELED EDGE
2½"
3⅛"

NAILS
TOP VIEW

FIGURE 1
FIGURE 2
FIGURE 3
FIGURE 4
MAKING AND USING AN EGG CANDLER
POULTRY, LEVEL II
Member Handout 2, Wood Box Egg Candler, Candled Eggs, continued

Wood Box Egg Candler

Figure 6—Candled Eggs (4-7 days)

Infertile (Market)  Live Embryo  Dead Germ
Constructing a Small Incubator

What Members Will Learn . . .

ABOUT THE PROJECT:
• The two most important factors in hatching eggs
• Incubation factors for several poultry species
• How to build a small incubator

ABOUT THEMSELVES:
• The importance of following directions
• The importance of patience in their lives

Materials Needed:
• Member Handouts 3 and 4, Incubation for Eggs of Domestic Birds
• Member Handout 5, Homemade Incubator with Automatic Temperature Regulator, plus all materials listed on this handout
• Hammer, screwdriver, tape measure, etc.

ACTIVITY TIME NEEDED: 60 TO 120 MINUTES

ACTIVITY:
Building your own incubator and then using it to hatch eggs will be a very exciting project. You will get a lot of satisfaction out of constructing the incubator and then watching it work.

The operation of the incubator will increase your knowledge as to the proper environment needed for hatching eggs.

Some incubators are made from a foam cooler using the cooler as an outside shell of the incubator, rather than wood. The other components of the incubator would be the same in either case.

There are several companies which supply incubators and incubator parts. Their addresses are listed below:

G.Q.F. Manufacturing Co.  
P.O. Box 1552  
Savannah, GA 31498  
Phone (912) 236-0651

Lyon Electric Co., Inc.  
Marsh Farms Products  
2765 Main Street  
Chula Vista, CA 92001  
Phone (619) 585-9900

Stromberg’s  
Box 400  
Pine River, MN 56474  
Phone (218) 587-2222

Val-A Company  
700 West Root Street  
Chicago, IL 60609  
Phone (312) 927-9442

Let members work in small groups to build the number of incubators desired.
Once your incubator is constructed, you need to operate it without eggs to master the temperature and humidity controls. When you are sure it is working properly, you are ready to begin your exciting project of hatching your own chicks.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What was the most difficult part of the incubator to make? Easiest? Why?
2. How did it feel after you had finished making the incubator?

**Process:**
3. What problems did you have while making the incubator?
4. What other items have you made that had similar problems?

**Generalize:**
5. How important is it to follow directions and do things in a specific order? (Give examples and discuss)
6. What did you learn about patience from this activity?

**Apply:**
7. What other things do you do that require specific directions and patience to accomplish? Why?

**GOING FURTHER:**
- Try hatching eggs of other species.
- Give a presentation on how you made your incubator.
- Use your incubator to hatch eggs in your school classroom.
- Use your incubator as a fair booth or window display.
REFERENCES:

Author:
John Struwe, Extension Assistant, University of Nebraska—Lincoln;
James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University,
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
# CONSTRUCTING A SMALL INCUBATOR

**POULTRY, LEVEL II**

Member Handout 3, Incubation for Eggs of Domestic Birds

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Chicken and Bantam</th>
<th>Turkey</th>
<th>Duck*</th>
<th>Muscovy Duck</th>
<th>Goose</th>
<th>Pheasant</th>
</tr>
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<tbody>
<tr>
<td>Incubation Period (days)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>28</td>
<td>28</td>
<td>35–37</td>
<td>28–34</td>
<td>23–28</td>
<td></td>
</tr>
<tr>
<td>Forced-Air Operating Temperature $^*$ (degrees F, dry bulb)</td>
<td>99$rac{3}{4}$</td>
<td>99$rac{3}{4}$</td>
<td>99$rac{1}{2}$</td>
<td>99$rac{1}{2}$</td>
<td>99$rac{3}{4}$</td>
<td>99$rac{3}{4}$</td>
</tr>
<tr>
<td>Humidity (degrees F, wet bulb)</td>
<td>85–87</td>
<td>83–85</td>
<td>84–86</td>
<td>84–86</td>
<td>86–88</td>
<td>86–88</td>
</tr>
<tr>
<td>Do not turn eggs after</td>
<td>19th day</td>
<td>25th day</td>
<td>25th day</td>
<td>31st day</td>
<td>25th day</td>
<td>21st day</td>
</tr>
<tr>
<td>Operating temperature during last 3 days of incubation (degrees F, dry bulb)</td>
<td>99</td>
<td>98$rac{1}{2}$</td>
<td>98$rac{3}{4}$</td>
<td>98$rac{3}{4}$</td>
<td>98$rac{1}{2}$</td>
<td>99</td>
</tr>
<tr>
<td>Humidity during last 3 days of incubation (degrees F, wet bulb)</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94$^{***}$</td>
<td>92–95</td>
</tr>
<tr>
<td>Open ventilation holes one-fourth</td>
<td>10th day</td>
<td>14th day</td>
<td>12th day</td>
<td>15th day</td>
<td>1st day</td>
<td>12th day</td>
</tr>
<tr>
<td>Open ventilation holes further if needed to control temperature</td>
<td>18th day</td>
<td>25th day</td>
<td>25th day</td>
<td>30th day</td>
<td>25th day</td>
<td>20th day</td>
</tr>
</tbody>
</table>

* It has been reported that duck eggs hatch better in still-air incubators than in forced-air incubators.

** For still-air incubators add 2 to 3°F to the recommended operating temperatures.

*** Better hatchability may be obtained if goose eggs are sprinkled with warm water or dipped in lukewarm water for half a minute each day during the last half of the incubation period.
CONSTRUCTING A SMALL INCUBATOR
POULTRY, LEVEL II
Member Handout 4, Incubation for Eggs of Domestic Birds

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Guinea Fowl</th>
<th>Peafowl</th>
<th>Bobwhite Quail</th>
<th>Coturnix Quail</th>
<th>Chukar Partridge</th>
<th>Grouse</th>
<th>Pigeon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation Period (days)</td>
<td>28</td>
<td>28–30</td>
<td>23–24</td>
<td>17</td>
<td>23–24</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>Forced-Air Operating Temperature* (degrees F, dry bulb)</td>
<td>99¼</td>
<td>99¼</td>
<td>99¼</td>
<td>99¼</td>
<td>99¼</td>
<td>99¼</td>
<td>99¼</td>
</tr>
<tr>
<td>Humidity (degrees F, wet bulb)</td>
<td>83–85</td>
<td>83–85</td>
<td>84–86</td>
<td>84–86</td>
<td>80–82</td>
<td>82–86</td>
<td>84–86</td>
</tr>
<tr>
<td>Do not turn eggs after</td>
<td>25th day</td>
<td>25th day</td>
<td>21st day</td>
<td>15th day</td>
<td>21st day</td>
<td>22nd day</td>
<td>15th day</td>
</tr>
<tr>
<td>Operating temperature during last 3 days of incubation (degrees F, dry bulb)</td>
<td>99</td>
<td>99½</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Humidity during last 3 days of incubation (degrees F, wet bulb)</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
<td>90–94</td>
</tr>
<tr>
<td>Open ventilation holes one-fourth</td>
<td>14th day</td>
<td>14th day</td>
<td>12th day</td>
<td>8th day</td>
<td>12th day</td>
<td>12th day</td>
<td>8th day</td>
</tr>
<tr>
<td>Open ventilation holes further if needed to control temperature</td>
<td>24th day</td>
<td>25th day</td>
<td>20th day</td>
<td>14th day</td>
<td>20th day</td>
<td>21st day</td>
<td>14th day</td>
</tr>
</tbody>
</table>

* For still-air incubators add 2 to 3°F to the recommended operating temperatures.

Think Back:
What do you think is the most unique feature of an egg? Why?
CONSTRUCTING A SMALL INCUBATOR
POULTRY, LEVEL II
Member Handout 5, Homemade Incubator With Automatic Temperature Regulator

Materials Needed

These materials are available at most farm supply stores.

Waterproof plywood ¼" (1.27cm) less than ¼ sheet
1 bottom 11" (27.94cm) x 15 ½" (39.37cm)
1 front 10 ¼" (27.30cm) x 15 ½" (39.37cm)
1 back 10 ½" (26.03cm) x 15 ½" (39.37cm)
2 ends 10 ¼" (26.03cm) x 10 ½" (26.67cm)

Board (¾" (1.90cm)) about 8 (2.43cm) running feet
1 ½" (3.81cm) wide
2 sides for tray 1 ½" (3.81cm) x 14 ½" (36.83cm)
2 ends for tray 1 ½" (3.81cm) x 8 ½" (22.22cm)
2 runners for tray ¾" (0.63cm) x 10 ¼" (26.03cm)
2 cleats for tray ½" (1.27cm) x 10 ½" (26.67cm)
2 base cleats 1 ½" (3.81cm) x 15 ½" (39.37cm)

Other material
2 butt hinges (about 1 ½"-3.81cm x 2"-5.08cm)
2 catches-screen door type (2"-5.08cm)
1 glass-double thick (12"-30.48cm x 16"-40.64cm)
1 glass-double thick (11"-20.32cm x 12"-30.48cm)

Hardware cloth (1 ¾"-3.17cm mesh) 10 ½"
(26.03cm) x 14 ½" (36.38cm)
1 cookie sheet 10" (25.40cm) x 14" (35.56cm)
1 wooden drawer-pull
1 thermometer

Misc. nails (8d), brads, screws, tape

Electrical heat control
1 temp. regulator (wafer thermostat with snap action switch)
2 standard base bulb receptacles (with concealed terminals)
2 bed-lamp type long 40-watt bulbs
10 feet (3.04m) of 2-wire replacement cord with plug
Determining the Sex of Poultry

What Members Will Learn . . .

ABOUT THE PROJECT:
• The different methods of determining the sex of young and mature poultry
• The reasons for separating day-old male and female poultry

ABOUT THEMSELVES:
• The importance of sexing birds on the finances of a producer

Materials Needed:
• Pictures, slides or illustrations of various breeds and varieties of chickens
• Member Handout 6, Feather Sexing Broilers

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:
Various methods have been developed to determine sex of both day-old and adult poultry. Sex of day-old chickens, turkeys, ducks, geese and guineas can be determined by these methods.

Feather Sexing. This is the most common method used for chickens and involves the following steps:
1. Spread wing out like a fan.
2. Look at feathers on outer joint—bottom row of feathers are primaries, top row of feathers are coverts.
3. When the bottom row (primaries) of feathers is longer than top row (coverts), the chick is a female.
4. When the bottom row (primaries) of feathers is the same length, or shorter than top row (coverts), the chick is a male.
Certain breeds or crosses may be difficult to sex using this method.

Japanese Vent Sexing. This method involves visual examination of the sex organ in the vent of the day-old bird. Structural differences between the male and female allows accurate determination of the bird’s sex. This method requires considerable practice to develop speed and accuracy. An experienced sexor can sex 400 to 600 birds an hour. This method is primarily used for turkeys.

Autosexing. The genetic code which determines what a bird looks like is carried on chromosomes. One chromosome carries the gene which determines the sex of the bird. This same chromosome carries other genes which result in differences in feather color, size, etc., based on the sex of

Leader Notes
Give members copies of Member Handout 6, Feather Sexing Broilers.
the bird. Some of these differences appear in day-old chicks. For instance, day-old, barred male chicks have completely black down except for a white spot on top of the head, while the non-barred females have all black down. This method is used most in gamebirds and exotic fowl.

The sex of mature birds can usually be determined visually by observing differences in their secondary sex characteristics. As birds near the age of sexual maturity, their gonads (ovary in the female and testes in the male) increase the output of the male sex hormone testosterone. This hormone causes development of visual external physical characteristics that can be used to determine the sex of sexually mature birds.

In chickens, the comb and wattles become bright red. Normally, the cockerel’s comb and wattles are larger than the pullet’s because of a higher blood level of testosterone. When the gonads of a chicken are inactive, such as during molting, the comb and wattles regress in size and lose their red color from a lower blood level of the hormone. Another influence of testosterone in the cockerel is development of male feathering on the hackles, back and tail. The feathers of the male are elongated with pointed tips while those of the female are short with rounded tips. Another characteristic of cockerels is they crow.

An adult male turkey (tom) has a more developed and a brighter colored snood and caruncle than the hen. Also, the tom usually has a tuft of coarse hair on its breasts called the beard.

Adult waterfowl are difficult to sex except those breeds of ducks, such as the Rouen and Mallard, in which the male (drake) has more brightly colored plumage than the female (duck). In Pilgrim geese, the male (gander) is white-feathered and the female (goose) is gray-feathered. In most breeds of ducks, the tips of the middle tail feathers on the adult drake curl forward. This does not occur on the duck. Sex of the adult goose can be determined by visual examination of the sex organ in the vent of the bird. The organ is much more developed in the gander than the goose.

Sexing adult guineas is very difficult because they differ so little in appearance. Usually, sex may be distinguished by the difference in the cry of the birds, and by the larger helmet, thicker wattles, and coarser head of the male. The cry of the female sounds like “buckwheat” or “put-rock,” and is quite different from the one syllable shriek of the male.

With a few exceptions, adult male chickens, turkeys, waterfowl and guineas have a larger body size than the female. The sex of some breeds of mature chickens is easy to tell because the male has more brilliant colored plumage than the female. The Rhode Island Red, New Hampshire Red, and Brown Leghorn are examples of this characteristic.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What are two methods to determine the sex of day-old poultry?
2. What are some of the physical secondary sex characteristics of adult poultry?

Process:
3. What species of poultry exhibit secondary sex characteristics that are more difficult to recognize? Why?
4. Why is it important to divide poultry species by sex?

Generalize:
5. What other animal projects have a need to split animals by sex? Why?
6. What management or feeding practices are affected by the sex of the bird or animal? Why?

Apply:
7. What other industries treat animal or bird species differently? (Consider economics, health, safety, etc.)

GOING FURTHER:
- Visit a poultry show, preferably one that has different breeds and varieties of poultry, and observe the differences in appearance of the males and females.
- Make arrangements to visit a hatchery and observe birds being sexed.
REFERENCES:

Poultry Science, by Ensminger

Standard of Perfection, American Poultry Association

Cobb-Vantress, P.O. Box 1030, Siloam Springs, Arkansas 72761-1030

Author:

Albert W. Adams, Extension Specialist, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:

R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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DETERMINING THE SEX OF POULTRY
POULTRY, LEVEL II
Member Handout 6, Feather Sexing Broilers

1. Spread wing out like a fan.
2. Look at feathers on outer joint—bottom row of feathers are primaries, top row of feathers are coverts.
3. When the bottom row (primaries) of feathers is longer than top row (coverts), the chick is a female.
4. When the bottom row (primaries) of feathers is the same length, or shorter than top row (coverts), the chick is a male.

Permission granted from Cobb-Vantress.
Maternal Bonding and Imprinting  
(Follow the Leader)  

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• How bonding occurs in poultry
• The value of a bonding relationship in poultry
• How to identify the various bonding relationships

ABOUT THEMSELVES:
• How they feel about bonding relationships

Materials Needed:
• Facilities to raise two or three newly hatched chicks for a week

ACTIVITY TIME NEEDED: 1 WEEK

ACTIVITY:
A typical feature of maternal behavior in poultry is that the prospective mother, if allowed to follow her natural instinct, will withdraw from the flock before the young are hatched. The hen finds a secluded site for laying a nest full of eggs and then incubating them.

After the young hatch, bonding between the hen and chicks occurs because the hen usually prevents contact between her chicks and other hens or chicks by chasing the intruders away. Hens recognize their own chicks, and the chicks learn to recognize their own mother. The hen attracts her own chicks by calling, and by tidbiting or pecking conspicuously at food or litter.

Chicks will form a bond with and follow the first animated object that they are exposed to several times after hatching. For example, if chicks are isolated after hatch and exposed to a moving object, such as a toy or a human, they tend to form a bond with the toy or human. This relationship is called imprinting or follow-the-leader behavior.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What happened as you raised the chicks with an animated object?

2. How long did it take for your chick to bond or imprint with the object?

Leader Notes
Introduce this topic and then have members raise a newly hatched chick or two for one week with another animate object. Bring the chicks and objects back a week later to observe and discuss the bonding that occurred.

Discuss this attraction in other birds, wildlife, and other animals. Could this be called parenting? Divide members into small groups of two or three to discuss and report back.

Either purchase or hatch a few chicks and spend time with them each day. Expose them to an animated toy several times each day and observe how long it takes them to follow you or the toy. The imprinting process is most effectively demonstrated when chicks are separated from each other.
Leader Notes

Process:
3. What problems did you have with this experiment?

4. Why do you think bonding occurs?

Generalize:
5. What other species have you observed bonding or imprinting?

6. What did you learn about yourself from this activity?

Apply:
7. How will your understanding of bonding be useful to you in the future?

8. What could you do different, to get different results, if you did the experiment again?

GOING FURTHER:
• Have someone in your group continue to raise the chicks together after the first week to see how they adapt.
• Videotape your second meeting to record the bonding that occurred.
• Share your experiences with other classmates or groups.

REFERENCES:
Poultry Sciences, Ensminger

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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64-Poultry, Level II
Preventing Cannibalism

Poultry, Level II

What Members Will Learn...

ABOUT THE PROJECT:
• Causes of cannibalism
• Ways to prevent cannibalism

ABOUT THEMSELVES:
• Preventive measures for self protection
• Behaviors they have that could be harmful to others

Materials Needed:
• Member Handout 7, Degrees of Beak Trimming and Anti-peck Devices
• Mechanical devices—specs, blinders, peck guards, bits (optional)

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Cannibalism in poultry is one bird pecking the feathers, combs, toes or vent of other birds. If cannibalism isn’t prevented, it can result in death or lowering of market value due to poor feathering and damaged bodies.

Usually, the exact cause of cannibalism cannot be traced to any one factor. Cannibalism may start because of:

• Overcrowding or overheating—may cause birds to be uncomfortable.
• A lack of a nutrient in the feed—particularly protein, may cause the birds to peck penmates’ feathers to satisfy their hunger for protein.
• Excessive light—can make birds nervous and allow them to better see wounds on penmates.
• Inadequate feeding and nesting space—increases the competition for feed and water which can encourage cannibalism.
• Mixing of birds of different ages, colors, or stages of maturity—disrupts the social order of a flock, encouraging cannibalism.

There are several different methods for prevention and control of cannibalism. Prevention stops the development of bad pecking habits before they get started. In some cases, removing the cause(s) will result in discontinuation of cannibalism.

Beak trimming, which is removal of a portion of the bird’s beak, is the best preventative measure. Beak trimming can be done at any age. There is no one beak trimming program that fits all situations. Broiler chicks are usually beak trimmed at the hatchery. Egg-type chicks are usually beak
trimmed at 6 to 10 days and again at 12 to 14 weeks of age. Beak trimming is best done with an electric beak trimmer.

Control with **mechanical devices** such as specs, blinders, peck guards or bits are used by some producers. These devices are attached to the bird’s beak and prevent pecking by either limiting their vision or preventing complete closure of its beak.

**Miscellaneous** methods that give variable results are: (1) providing other objects for the birds to peck, such as alfalfa hay, (2) increasing the salt content of the ration, and (3) darkening the interior of the pen or using red-colored lights. These adjustments make it more difficult for the birds to see bloody wounds on penmates.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. How did the chick react after the beak was trimmed?

2. What problems did you or others have when trimming beaks?

**Process:**
3. Why is it often necessary to trim beaks?

4. What other methods have you used or observed that help prevent cannibalism in poultry?

**Generalize:**
5. What are some preventative measures that producers do to provide for the general safety of other farm animals?

6. What are some safety precautions that you use everyday at home or school? Why?

7. How do you attempt to prevent a friend’s negative behavior?

**Apply:**
8. What are some ways to prevent negative group behavior?

**GOING FURTHER:**
- Research the common causes of poultry cannibalism to see which is the most prominent.
- Give a presentation on the need for preventing cannibalism in poultry.
REFERENCES:
*Poultry Science*, Ensminger
*Cannibalism in the Small Poultry Flock*, K-State Research & Extension Publication

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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PREVENTING CANNIBALISM
POULTRY, LEVEL II
Member Handout 7, Degrees of Beak Trimming and Anti-Peck Devices

BEAK TRIMMING

1. Under 10 days

2. During growing period

3. Adult

ANTI-PECK DEVICES

1. Specs on laying hen
The Peck Order
Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• To define peck order in chickens
• How the peck order is established
• How the peck order affects the stability and performance of the flocks

ABOUT THEMSELVES:
• Their understanding of group dynamics
• How they feel about social and economic status among peers

Materials Needed:
• Flock or small group of 6- to 10-week-old birds
• Activity Sheet 6, Peck Order Observations

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

It has been known for some time that animals and birds form social organizations called peck orders. In a well-organized peck order, each bird has a certain status which refers to its position or rank in relation to others. The bird’s status can be either dominant or subordinate to others in the flock. Dominance is usually attained initially by aggression, or forcefulness. The opposite of aggression is submission. Submissive behavior is usually beneficial for smaller, weaker and younger birds because it allows them to live with more aggressive, dominant birds.

Some major observations of the peck order among birds are:
• Aggressiveness is most apparent when birds are competing for something such as food.
• The social structure of a flock can be simple or very complex.
• Birds low on the peck order often get very little feed and water, appear to be nervous and frightened, and, if males, rarely have an opportunity to mate.
• When adult strangers meet, they promptly establish a peck order.
• Although peck orders tend to be rather stable, physiological changes such as molting, can change the peck order in a flock.

Newly hatched chicks are not aggressive, but play fighting or sparring gradually appears and is common by the third week after hatching. Males become aggressive earlier than females; peck orders are evident among cockerels by 6 to 8 weeks, and among pullets by 8 to 10 weeks. Typically, male chicks are dominant to females.
Peck orders may be simple or complex. In very small groups, **linear** peck orders are common and for a group of four could be shown as:

\[ \text{A} \rightarrow \text{B} \rightarrow \text{C} \rightarrow \text{D} \]

where A pecks B, C and D; B pecks C and D, but is pecked by A; C pecks only D; and D is pecked by all.

A more complicated peck order might include a **pecking triangle**, thus:

![Pecking Triangle Diagram]

where A pecks B, B pecks C, C pecks A, and all three in the triangle peck D.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**

1. What happened when you observed birds for peck order?

2. Were the aggressive or submissive birds easiest to identify? Why?

3. What behavior did you observe the most?

**Process:**

4. What problems did you have in making your observations?

5. Why do you think a peck order occurs in chicks?

6. What is significant about a peck order in free roaming birds as compared to housed or caged birds?

**Generalize:**

7. What did you learn about yourself from this activity?

8. How do social or economic levels affect people?
Apply:
9. What are the differences in being a group leader or a group member?
10. How might an understanding of how groups work together help you in the future?

GOING FURTHER:
• Share your experience with your class or others.
• Individually identify a small group of 6- to 10-week-old birds and observe them to determine their peck order.

REFERENCES:
Poultry Science, Ensminger

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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THE PECK ORDER
POULTRY, LEVEL II
Activity Sheet 6, Peck Order Observations

<table>
<thead>
<tr>
<th>Chick ID</th>
<th>Activity Observed</th>
<th>Relative Order</th>
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Think Back:
What do you think is the most significant aspect of bird behavior? Why?
Economics of Broiler Production

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
- Meat production strains of chicks
- Pounds of feed it takes to produce a pound of live chick
- Cost of producing a pound of meat

ABOUT THEMSELVES:
- The importance of responsibility in raising broilers
- The importance of planning, budgeting and record keeping

Materials Needed:
- Facilities and equipment to raise specified number of broilers (optional)
- Activity Sheet 7, Broiler Production Planning
- Activity Sheet 8, Broiler Budget
- Activity Sheet 9, Broiler Production Record

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY:
The intent of this lesson is to help you to raise broilers either for family use or for selling to others. You should have studied several previous lessons about the specifics of caring for day-old chicks.

First, we will consider a few basic questions that must be answered in order to prepare for your broiler project.

Now let’s think about planning for the costs involved in producing broilers. We use a budget to help determine if there is at least a possibility of making a profit. As we prepare the budget we must consider production goals. Also, we must consider there will be some fixed costs for equipment, facilities and other variable costs for feed and other materials. Finally, we must consider how much income we can expect to make.

If you decide to actually raise broilers, you will need to keep accurate records to determine if you are within your budget and whether or not you can raise broilers efficiently enough to make a profit.

Leader Notes
Give each member Activity Sheet 7, Broiler Production Planning. Let members discuss the planning sheet in small groups. Have each group report their findings for total group discussion.

Give each member Activity Sheet 8, Broiler Budget, to discuss in their small groups before reporting back to the entire group. You may want to give members these planning and budget sheets a week prior to this meeting to give them a chance to research some answers from the local community.

Give each member planning to actually raise broilers Activity Sheet 9, Broiler Production Record. Make plans for the members to visit the production locations to observe and discuss the experiences encountered. You may want to visit immediately after chicks are purchased and again in two or three weeks. Compare actual records with budget proposals after birds are sold.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. Did you decide to actually raise some chicks? Why? Why not?
2. If you raised chicks, what happened the day you received them?
   If you did not raise chicks, what questions in the planning guide helped make this decision? Why?

Process:
3. If you raised chicks, what problems did you have? Why?
   If you did not raise chicks, how did the budget sheet affect your decision?
4. If you raised chicks, what responsibilities did you have?
   If you did not raise chicks, how did the responsibility for their care affect your decision?

Generalize: (Use for either situation)
5. What did you learn from this experience? How will it help you make decisions in the future?

Apply: (Use for either situation)
6. How will the planning, budgeting and record keeping process be useful in the future?

GOING FURTHER:
- Organize your poultry club to raise broilers as a community project for a club money raising activity.
- Share your experiences by giving presentations to your school class, other members or community groups.
- Consider raising broilers several times a year.
REFERENCES:
Authors:
Sam Varghese, Extension Specialist, Department of Animal Sciences, Michigan State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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ECONOMICS OF BROILER PRODUCTION
POULTRY, LEVEL II
Activity Sheet 7, Broiler Production Planning

1. What hatchery is available or should be used to order chicks from?

2. Will you purchase straight run (approximately 50% male and 50% female) or all cockerels?

3. What strain of broiler chicks should be ordered?

4. What month or date should the project begin?

5. What live weight of bird do you plan to sell?

6. Will you sell birds live or dressed?

7. What types of feeds or rations will be needed?

8. Is proper feed available from your local feed store?

9. 

10. 

* List other questions you might have
ECONOMICS OF BROILER PRODUCTION
POULTRY, LEVEL II
Activity Sheet 8, Broiler Budget

A. PERFORMANCE GOALS: Projections

Average live weight (straight run) 4.0 lb at 7 weeks
Feed conversion 2.1 lb/lb live wt
Dressing yield 73% of live wt
Mortality 4%

B. INVESTMENT:

Building—use existing building $ ______________________
Equipment—used equipment $ ______________________
TOTAL $ ______________________

C. INCOME:

Sold Live - ___ lb. live wt./bird $ ______________________
× ___ price/lb. × ___ birds
Sold Dressed - 73% × ___lb. live weight/bird =___ lb. dressed wt/bird
× ___ price/lb. × ___ birds
TOTAL $ ______________________

D. EXPENSES:

Feed-___lb. live wt./bird × ___ feed conversion × ___ feed cost/lb. × ___ birds $ ______________________
Interest-equipment___initial cost × ___interest rate- $ ______________________
Cost of:
Chicks $ ______________________
Fuel $ ______________________
Litter $ ______________________
Misc. $ ______________________
TOTAL $ ______________________

E. RETURN TO MANAGEMENT AND LABOR
(Total Income minus Total Expenses) $ ______________________

Regulations. The processing and selling of most poultry meat in Kansas comes under the Kansas Meat and Poultry Inspection Act, which is administered by the Meat and Poultry Inspection Division, Kansas Department of Agriculture, 109 S.W. 9th Street, Topeka, KS 66612 (785-296-3511). Exemptions to the Act are the slaughtering by a person of poultry raised by him/her and used exclusively for use by him/her and members of his/her household and nonpaying guests and employees, and poultry producers with respect to poultry they have raised on their own farms may slaughter and sell not more than 250 turkeys or 1,000 broilers per year if they do not engage in buying and selling poultry products other than those they raised and none such poultry is sold to other than directly to household consumers.

Adapted from Is Poultry Production a Business for You?, MF-824, Kansas State University, May 1986.
# ECONOMICS OF BROILER PRODUCTION
## POULTRY, LEVEL II
### Activity Sheet 9, Broiler Production Record

## FEED RECORD
Record the kind, amount and value of feed each time a purchase is made or a quantity of home-raised feed is set aside for the project.

<table>
<thead>
<tr>
<th>Date</th>
<th>Kind of Feed (grain, mash supplement, etc.)</th>
<th>Quantity of Feed (lbs.)</th>
<th>Cost</th>
<th>Remarks: beginning ration, feed changes, feeding troubles, etc.</th>
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Total Feed Costs

## Production Summary
1. Breed of Chicks purchased (circle one)  
   Straight run  
   Sexed
2. Date project started ________________________________ ended ________________________________
3. Number days of project ________________________________
4. Number of birds started (a) ________________________________
   Number of birds raised (b) ________________________________
   Number of birds that died (c) ________________________________
5. Percent death loss (line 4c divided by line 4a × 100) = _________ %
6. Pounds of feed used ________________________________
7. Pounds of live poultry produced ________________________________
8. Pounds of feed to produce a pound of bird (divide line 6 by line 7) ________________________________
ECONOMICS OF BROILER PRODUCTION
POULTRY, LEVEL II
Activity Sheet 9, Broiler Production Record, continued

Other Things Learned:
1. What was your brooderhouse temperature? 1st week ___ 2nd week ___ 3rd week ___ 4th week ___ 5th week ___ 6th week ___ 7th week ___

2. What type of ventilation was used? __________________________________________________________

3. What type of heat source was used? __________________________________________________________

4. What type of litter was used? _______________________________________________________________

5. What type of feeder was used? ___________________________ How many? ___________________________

6. What type of waterer was used? ___________________________ How many? ___________________________

FINANCIAL SUMMARY

Income:

<table>
<thead>
<tr>
<th>Date</th>
<th>Items Sold or Used at Home (Indicate Which)</th>
<th>Quantity</th>
<th>Amount</th>
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Total $_______

Costs:

<table>
<thead>
<tr>
<th>Date</th>
<th>Items Bought, Used, Labor Costs, Value of Home-Grown Products</th>
<th>Quantity</th>
<th>Amount</th>
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Total $_______

Summary:
Total Project Income $_______
Total Project Costs $_______
How Much Money Made or Lost $_______
What Members Will Learn . . .

ABOUT THE PROJECT:
- Equipment needed for a small flock
- Purpose for each piece of equipment

ABOUT THEMSELVES:
- Equipment needed for their health and safety
- Equipment (or furniture) they have that makes life easier or more comfortable, but is not necessary

Materials Needed:
- Several poultry equipment catalogs
- Samples of small flock equipment (optional)
- Activity Sheet 10, Poultry Furniture
- Activity Sheet 11, People Equipment-Furniture

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

There are many different feeders and waterers that can be used in the poultry house. You have equipment for small flocks and equipment for large flocks. The equipment is very different for each situation.

Compare the different styles of feeders, waterers and other equipment. Notice the wide range of equipment that is available to a producer.

Make a list of the equipment you would need for a small farm flock on the Activity Sheet, Poultry Furniture. List the function or purpose of each piece of equipment. Discuss what equipment is necessary and what is convenient or makes caring for the flock easier.

Next, use Activity Sheet, People Equipment-Furniture, to list all the pieces of equipment that are necessary for your health and safety, plus other items that you have that make life easier or more fun, but are not necessary.

Leader Notes

Obtain an equipment catalog that has a selection of different equipment. You should have more than one catalog as small flock equipment will be in a different catalog than large commercial equipment. Your local K-State Research and Extension agent may be able to help you acquire the necessary catalog.

Hand out Activity Sheet 10, Poultry Furniture. Let two or three members work together. Have each group discuss their lists.

Discuss the difference between necessary and nice or convenient. Have members circle five to 10 items needed most.
DIALOGUE FOR CRITICAL THINKING:
Share:
1. What was unique about your list of poultry equipment? What items did everyone list?
2. What portion of the items was necessary?

Process:
3. Why is size of equipment important?
4. Did you consider purchasing any equipment strictly for convenience? Why? Why not?

Generalize:
5. What did you learn about equipment or furniture in your house?
6. Which list of furnishings was longer, necessary or nice? Why?

Apply:
7. How did you decide what was really necessary?
8. How will you act differently in the future a result of this activity?

GOING FURTHER:
• Compare differences in equipment needed for a large commercial producer and a small farm flock.
• Compare differences in equipment and housing for baby chicks as opposed to a laying house.
• Discuss confinement versus free roam egg production.
REFERENCES:
Management of a Small Flock of Poultry, Kansas State University, C-507

Author:
John Struwe, Extension Assistant, University of Nebraska–Lincoln; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
List the equipment you would need for a small farm flock of laying hens or for raising a few day-old chicks for broilers.

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<thead>
<tr>
<th>Equipment</th>
<th>Function</th>
<th>Necessary</th>
<th>Nice</th>
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POULTRY FURNITURE
POULTRY, LEVEL II
Activity Sheet 11, People Equipment-Furniture

1. Make a list of the furniture, appliances and other equipment you have in your house.
2. Check if each item is necessary for your health or safety or just nice and convenient.
3. Circle five to 10 items that are needed for survival.

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<tr>
<th>Equipment</th>
<th>Function</th>
<th>Necessary</th>
<th>Nice</th>
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</table>
Types of Poultry Housing

What Members Will Learn . . .

ABOUT THE PROJECT:
• To identify several types of poultry housing
• To match age and type of bird with proper housing type

ABOUT THEMSELVES:
• Differences in human housing in their community and around the world
• Their feelings about housing or room needs for various ages of people

Materials Needed:
• Magazines, catalogs, library books and other pictures of different types of poultry housing
• Pictures of human houses from around the world
• Scissors, glue, scrapbooks

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY:

There are many examples of poultry housing. They all have the same function; that is, to provide shelter and a healthy environment for the birds, as well as a pleasant environment for the caretaker. Some are very elaborate and others are simple, depending on the purpose.

Collect pictures of poultry houses from magazines and catalogs or make photocopies from library books. Paste your pictures in a scrapbook and arrange them by type of house and/or age and type of poultry they are best suited for.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. How many different types of poultry houses did you find?

2. What were the similarities and differences of most poultry houses?

Process:
3. What were some of the major features of poultry housing? Why?

4. What are the differences between housing for young chicks as compared to laying hens?

Leader Notes
Assist members by providing magazines, catalogs, etc., with poultry and human housing pictures.
Generalize:
5. What features do you feel are needed in houses for people?

6. What housing features are needed in extremely cold climates as compared to extremely hot climates?

Apply:
7. How do housing needs change for young children as compared to senior citizens?

8. How will you act differently in the future as a result of this activity?

GOING FURTHER:
• Exhibit your scrapbook at the county fair.
• Give a talk to your school class about poultry and human housing around the world.
• Tour poultry facilities of different types in your area.

REFERENCES:
Egg Industry, Broiler Industry, and Turkey World magazines, Watt Publishing Co, 122 S. Lesley, Morris, Illinois 61540

Author:
John Struwe, Extension Assistant, University of Nebraska–Lincoln; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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88-Poultry, Level II
How Birds Adapt to Their Environment

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• How birds respond to changes in their environment
• How the environment affects productivity and the quality of eggs and meat
• What people do to help birds adapt to their environment

ABOUT THEMSELVES:
• How their body adjusts to changes in temperature, humidity, air movement and light
• What humans do to make their environment more comfortable
• The environmental factor that affects their comfort the most

Materials Needed:
• Member Handout 8, Exterior Views—Modern Poultry House
• Member Handout 9, Interior Views—Modern Poultry House

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY:

Adequate protection of poultry from extreme changes in their environment is necessary for their welfare and productivity. Modern poultry housing has enabled man to better control the environmental conditions surrounding poultry, making it possible to attain high productivity regardless of the external, or outside, environment surrounding the birds. Improving the birds’ environment also allows the caretaker to be more comfortable while taking care of the birds. The main environmental factors birds have to adjust to are temperature, humidity, air flow and light.

Temperature
The fowl is constantly losing heat to its environment because its normal body temperature of 105° to 107°F is usually higher than the air temperature. In addition to the heat produced by the bird, additional heat is added to the bird’s environment by the sun, artificial sources such as brooder stoves and the decomposition of manure and litter in the house. The most comfortable temperature range for fowl depends on the species, age and size of the bird. For example, because a baby chick is small and has a very thin feather coat, it needs a temperature of 95°F during the first week of its life. In contrast, a laying hen that has a full coat of feathers is most comfortable in a temperature range of 65° to 80°F.
How birds adjust to temperature changes.

<table>
<thead>
<tr>
<th>Cold Weather</th>
<th>Hot Weather</th>
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<tbody>
<tr>
<td>Fluff feathers</td>
<td>Spread wings</td>
</tr>
<tr>
<td>Eat more feed</td>
<td>Eat less feed</td>
</tr>
<tr>
<td>Huddle together to share heat</td>
<td>Lay on cool surfaces such as the ground</td>
</tr>
<tr>
<td>Increase activity</td>
<td>Decrease activity</td>
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<tr>
<td></td>
<td>Drink more water and pant</td>
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</table>

Reduced feed consumption reduces egg production and growth; increased feed consumption increases the cost of producing eggs and meat.

Humidity

Birds tolerate a wide range of humidity. For birds on litter, a humidity level below 30 percent may result in excess dust. Humidity above 75 percent may cause wet litter. High humidity during hot weather reduces the ability of birds to cool themselves by panting. During cold weather, high humidity makes the birds more uncomfortable.

Light

Light striking the head of the bird triggers responses that influence reproduction, growth and behavior. The trigger for this stimulation is the amount of light (daylength) per 24 hours. Short daylengths (8 to 10 hours) or decreasing daylengths while birds are growing delays sexual maturity; increasing daylengths stimulates sexual maturity. A 14- to 17-hour day is required for optimum egg production. The intensity of the light that is needed varies between species. Birds respond more to the red end of the light spectrum than the blue-green end.

Ventilation

Air movement is an important part of a bird’s environment. It provides oxygen to the birds and removes toxic gases such as carbon dioxide and ammonia, removes dust particles from the air, dilutes the microorganisms in the air, and regulates the temperature and humidity of the air.

Examples of how humans help birds adapt to their environment.

1. Temperature:
   - Insulation of poultry houses
   - White roof surface to reflect heat
   - Increase air flow during hot weather and decrease during cold weather
   - Spray birds or house with water during hot weather
   - Shade for birds in outdoor pens
   - Cool water for birds during hot weather
   - Supplementary heat for young birds

2. Humidity:
   - Reduce water spillage
   - Ventilation to remove moisture from house

Give members Member Handouts 8 and 9, Exterior Views—Modern Poultry House and Interior Views—Modern Poultry House. Have members list features that modify the bird’s environment. Have members compare these features to those found in their environment.
3. Light:
   • Low light intensity in light-tight houses to discourage cannibalism
   • Blue lights when catching broilers because humans can see better in blue light than birds
   • High light intensity to discourage broodiness in breeding turkeys
   • High light intensity to stimulate day-old birds to eat and drink; particularly important for poults because of poor eyesight at hatching
   • Night lights during hot weather to stimulate feed consumption

4. Ventilation:
   • Fans to supplement natural ventilation
   • Increase air flow during hot weather, decrease during cold weather

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What are the main environmental factors that affect birds?

2. Which environmental factor was easiest or most difficult to understand? Why?

**Process:**
3. Which environmental factor do you think is most significant?

4. What environmental factor would be the most important for chicks? Laying hens?

**Generalize:**
5. Which environmental factor is most critical for you? Why?

6. What environmental factor is easiest to control in your house? Why?

**Apply:**
7. How will understanding your environment help in the future?

**GOING FURTHER:**
• Make arrangements to tour a modern poultry house.
Think Back: (record on a separate sheet)
What are the main environmental and economic features to consider when raising poultry?

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The control of environmental extremes in poultry housing has produced drastic changes in management systems for laying hens. The number of birds per foot of house has been doubled with reduced stress on the birds, increasing both quality and quantity of eggs.

This insulated, windowless, 38-foot wide house has a capacity of 60 birds per foot length. The length can be varied in increments of 8 feet according to the size of flock desired and the maximum capacity of the mechanical equipment installed.

Positive ventilation is provided by thermostatic controlled exhaust fans. A continuous adjustable inlet, under the eaves, can be adjusted to direct incoming air along the ceiling in cold weather or along walls and ceiling in warm weather.
HOW BIRDS ADAPT TO THEIR ENVIRONMENT

Leader Notes

POULTRY, LEVEL II

Member Handout 9, Interior View—Modern Poultry House

Electrical

- Lighting Outlet
- Duplex Convenience Outlet
- Grounded
- Special Purpose Outlets
- EG—Egg Grader
- EW—Egg Washer
- ERC—Egg Room Cooler
- FA—Feed Bin Auger
- VF—Ventilation Fan
- S SPST Switch
- SPST Switch w/Pilot Light
- SPDT Time Switch (230 Volts)
- T Low Volume Thermostat
- T Medium Volume Thermostat
- T High Volume Thermostat

Distribution Panel—(Fuse or Circuit Breaker)

D.P.D.T. Service Entrance Switch for Use With Stand—by Generator

Notes:

1. All permanent wiring should comply with the national electric code and any other local codes in authority.
2. Non-metallic wiring, switches, lampholders and receptacles are recommended. (See nec art. 336-3)
3. 1/2 hp or larger motors should be connected to 230 volts.
4. Lighting circuits should be equally divided on 115-volt sides of the service to balance load on system. Ampere load on any circuit should not exceed 80% of the rating.
5. Incandescent lamps, rated at 110 to 120 volts and 25 watts on 10-foot centers, are recommended for use with light-colored ceilings or with shallow dom reflectors. Lamps should not be more than 6 feet above the lowest feeder or provide at least 1 foot candle minimum intensity for birds in lowest cages.
6. Consult with equipment manufacturer for details and dimensions of cages and other equipment.

Specifications:

1. The design is expandable in 8-foot sections of length and is 38 feet wide.
2. The windowless, clear span building uses trusses 4 feet O.C. with cages hanging from bottom chord of trusses.
3. Three inches of insulation are used in the ceiling and 2 inches are used in walls.
4. The egg cooling room uses 2 inches of rigid foam insulation.
5. The design is for either frame or post construction, with metal roof and siding.
6. The ventilation system uses exhaust fans and adjustable slot inlets.
7. The manure is removed frequently by a scraper and deposited in a loader or storage area.

Based on: West Virginia University Plan PO-123
What Members Will Learn . . .

ABOUT THE PROJECT:
• The four basic parts of a feather
• Basic structural parts of a feather
• The three types of mature bird feathers
• Three types of feathers according to location

ABOUT THEMSELVES:
• The importance of feathers in their everyday life

Materials Needed:
• Magnifying glasses
• Samples of feathers or live chickens
• Member Handout 10, Parts of a Feather
• Member Handout 11, Types of Feathers and Location
• Member Handout 12, Feather Locations

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Birds, like all vertebrates, have a skeleton, a backbone and two pairs of limbs. The most distinguishing feature that is unique to birds are their feathers. Feathers are appendages of the skin. They may vary from soft down feathers that lie close to the body to body feathers and flight feathers. The down feathers help keep the bird warm. Body feathers follow the shape of the bird’s body. The large feathers in the wing and tail are called flight feathers. Chickens also have hairlike feathers. At least once a year birds shed (molt) their feathers.

Feathers of a bird serve several different functions such as regulation of temperature, flight and protection. They also can be used to identify secondary sex characteristics. Feathers come in many shapes, sizes and textures. There are different kinds of feathers such as flight, fluffy and male- and female-type feathers. Feather appearance differs between the sexes in the neck, back, saddle and tail sections. In these areas, the tips of the male’s feathers are pointed while those of the female are rounded.

At hatching, baby chicks are covered by down feathers that are soft, fine and fluffy. These feathers are quickly replaced by several coats of coarser type feathers, as the bird matures. When we look at a feather we can see that it has four distinct parts: the quill, shaft, fluff and web.

The basic structure of feathers is the same in all birds. The shaft (or stem), which projects from the skin, is often hollow filled only with spongy
keratin. (Keratin is the horny substance of which the feather is made). There are many branches along either side of the shaft that form a flat surface called the vane, which is made up of barbs, barbules and hooklets. The web is formed by barbs, that are made up of rows of smaller branches, called barbules. The barbs are all the same, except perhaps for some variation in length, but the barbules differ according to the side of the barb from which they branch. Those pointing toward the tip of the feather bear hooklike projections, while those pointing toward the feather base are curved and hence may be called bow barbules. The barbules interlock with other barbs and help form a continuous smooth-looking appearance. If the connection should be broken they can easily be hooked together again. The fluff is a series of barbs which have no barbules. The side branches of the barbs are short and threadlike.

The feathers of an adult can be classified into three types: (1) contour feathers, (2) plumules and (3) filoplumes. Contour feathers are the outermost feathers. These feathers vary a lot in both length and thickness. They range from the larger and stiffer primary and secondary flight feathers and the tail feathers to the softer and more delicate feathers that cover the body and give it shape.

The plumules or down feathers make the underplumage of the bird. Each of these feathers has a quill and a soft head of fluffy branches because the barbules radiate freely and are not interlocked like they are in the contour feathers. This type of feather is often plucked from the breast to line the nest and keep the eggs warm. In certain species, such as the goose, these down feathers are gathered commercially to produce the lining for sleeping bags, coats, etc.

The filoplume feathers have a short, flexible, hairlike shaft with barbs that are confined to the tip of the feather. These are much smaller in size than the other feathers and stand up like hairs and are easy to observe if you look at a plucked chicken.

Feathers are also named according to their location on the bird’s body and also by function. There are usually 10 flight feathers on the outer part of the wing, called the primaries. Often, these are sharply pointed and asymmetric with a very narrow outer vane. The flight feathers next to the body are called secondaries. They have inner and outer vanes of almost equal size. The secondaries vary greatly in number depending on the length of the wing. Covert feathers shape the wing profile and generally insulate and protect the wing. Contour feathers is the name given to those on the body. We can guess the function of the down feathers from their use in sleeping bags and quilts. These are also feathers which serve chiefly for decoration and display.

**DIALOGUE FOR CRITICAL THINKING:**
Share:
1. What are some of the differences you see in feathers?

2. What differences are there in how feathers feel?
Process:
3. What are the four basic parts of a feather?

4. What are some functions of feathers?

Generalize:
5. What do people use feathers for?

6. Why have some feather substitutes been used?

Apply:
7. What do you think is the commercial value of feathers?

8. How will you act differently in the future as a result of your increased knowledge of feathers?

GOING FURTHER:
- Examine feathers from different species or breed varieties and compare.
- Visit a poultry show and observe the different types of feathers on different species and breeds.
- Research additional uses of feathers that benefit humans.

REFERENCES:
Structure and Function of Domestic Animals, W. Bruce Currie
The Standard of Perfection, American Poultry Association, 26363 S Tucker Road, Estacada, Oregon 97023
Poultry Science, Ensminger
Poultry Science, Adams

Author:
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
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97-Poultry, Level II
TYPES OF FEATHERS AND THEIR FUNCTIONS
POULTRY, LEVEL II
Member Handout 10, Parts of a Feather
TYPES OF FEATHERS AND THEIR FUNCTIONS
POULTRY, LEVEL II
Member Handout 11, Types of Feathers and Locations

Types of Feathers
(Mature Bird)

Types of Feathers
(Based on Location)
TYPES OF FEATHERS AND THEIR FUNCTIONS
POULTRY, LEVEL II
Member Handout 12, Feather Locations

Hackle
Ear lobes
Eye
Points
Comb
Base
Beak
Wattles

Ear
Ear lobes
Hackle
Points
Comb
Base
Beak
Wattles

Back Cape
Hackle
Wing Bow
Wing Bar
Breast

Saddle
Main Tail
Sickles
Lesser Sickles
Saddle Feathers
Fluff
Shank
Spur

Thigh
Hock
Claw
Primaries or flight feathers
Secondaries

100-Poultry, Level II
Feather Colors and Patterns
Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
• Five types of feather patterns
• How feather patterns can be used to identify the breeds and varieties of chickens

ABOUT THEMSELVES:
• The significance of various patterns in their life

Materials Needed:
• Samples of feathers—the seven patterns discussed below (if possible)
• Pencils
• Activity Sheet 12, Standard Feather Patterns
• Leader’s Key, Activity Sheet 12, Standard Feather Patterns

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY:
Feathers come in many different colors and have a variety of patterns, which help distinguish between breeds and varieties. Some of these patterns are: penciled, spangled, mottled, laced, barred, striped or tipped.

Common feather colors are white, black, red and buff. The different feather patterns usually contain two or more different colors. In some breeds or varieties of chickens, such as the New Hampshire Red and Brown Leghorn, the male has more brightly colored feathers than the female.

Penciled patterns are narrow markings, uniform in width, sharply defined and continue in an unbroken line following the contour of the feather. A spangled feather pattern is a distinct marking of a contrasting color at the tip of each feather, forming a V-shape with a rounded end. Mottled feathers are similar to spangled feathers, except that the markings are always white and found on a variable percentage of feathers, not all of them. Laced patterns have a border of contrasting color around the entire web of a feather. The border is usually narrow and uniform in width. The barred pattern describes alternate colored crosswise markings on a feather. Striped color patterns have a stripe which extends through the web and runs parallel with the outer edges of the feather and tapers to a point near the lower end of the feather. Tipped feathers have white markings at the tips of feathers in mottled and spangled breeds.

Leader Notes
Hand out Activity Sheet 12, Standard Feather Patterns. You can have members complete the matching exercise prior to the explanation of the color patterns or have them fill in their sheets as you go. Have members try to identify the patterns on real feathers.
**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What color patterns did you see in the feathers you had?
2. Which pattern was the most difficult to identify? Why?

**Process:**
3. Why are feather patterns important?
4. What feather patterns are most common? Why?

**Generalize:**
5. What other things have significant color patterns? Why?

**Apply:**
6. How important do you think patterns will be in the future? (Try to list examples)

**GOING FURTHER:**
- Examine feathers from different species and compare.
- Visit a poultry show and observe the different colors and color patterns of the different breeds and varieties.
- Make a display of feather color patterns to share with your club or classroom.
- Develop a collection of feathers.
- Go to an art or craft show and view uses of feathers.

**REFERENCES:**
*Structure and Function of Domestic Animals*, W. Bruce Currie
*The Standard of Perfection*, American Poultry Association, 26363 S Tucker Road, Estacada, Oregon 97023
*Poultry Science*, Ensminger
Author:
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

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103-Poultry, Level II
Think Back:
What is the value of feathers in your life? Why?
FEATHER COLORS AND PATTERNS
POULTRY, LEVEL II
Leader’s Key, Activity Sheet 12, Standard Feather Patterns

Draw a line from the name of the feather pattern to the correct picture.
Talking Like a Poultry Raiser

What Members Will Learn . . .

ABOUT THE PROJECT
• To define and use 20 common poultry terms in sentences

ABOUT THEMSELVES:
• Their preferred learning method
• Their feelings about learning specific terminology for hobbies or a career

Materials Needed:
• List of terms and definitions

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY:
Understanding various poultry terms helps members expand their knowledge of poultry production and products. Whether a member is judging a class of chickens or eggs, reading about poultry, or simply talking with others, the ability to use correct terms will be very helpful.

Quiz Bowl—Definitions make excellent questions for quiz bowl use. To hold a quiz bowl, divide the members into two teams, read a definition or term to the teams, and give the team answering it correctly a point.

Drawing—Many of the terms can be understood more clearly by having your members make a drawing of what they think it means. Have them explain their drawings or sketches to each other.

Charades—Your members will enjoy acting out many of the terms as the rest of the group tries to figure out the term. To play charades, hand out or have them draw terms and let them take turns doing a charade.

Poultry Terms
Here are some terms that are used in describing and working with poultry and poultry production. Some uses are quite general and others are more specific. Quite a few terms you hear will be used only by the poultry judge or raiser of exhibition poultry. Some terms which have specific meanings for producers of waterfowl and turkeys are included in a separate list.

Avian—relating to or pertaining to birds.

Axial feather—the short feather in the middle of the wing that separates the primary feathers from the secondary feathers.
Leader Notes

*Bantams*—miniature chickens, usually one-fourth to one-fifth the size of regular chickens.

*Barring*—two alternating colors on a feather, running across its width.

*Bird*—an individual of any avian species.

*Blade*—the portion of a single comb below the points.

*Bow-Legged*—a deformity in which the legs are farther apart at the hocks than at the feet.

*Brassiness*—the light yellowish metallic cast commonly found in the plumage of white or partly white varieties.

*Breed*—a group of chickens within a class with a distinctive body shape and having the same general feathers and body weight.

*Broody*—the characteristic of birds to develop motherly instincts for setting on eggs and brooding chicks.

*Candling*—examining the contents of an egg by holding it up to a light source in a darkened room.

*Capon*—a castrated male chicken, usually processed at about 5 months of age for meat purposes.

*Carriage*—the posture of the bird.

*Chalaze*—white, twisted, cord-like structures which hold the yolk in the center of the white of an egg.

*Class*—a group of chickens that has been developed in a particular region of the world.

*Close Feathered*—feathers held tight to the body.

*Cockerel*—a male chicken under 1 year of age.

*Comb*—the fleshy protruding part on top of the head of a fowl.

*Condition*—the state of a bird’s health, including sufficient fleshing and cleanliness and brightness of plumage.

*Cornish Game Hen*—an immature chicken, usually processed at 5 to 6 weeks of age, from one of the Cornish meat-type crosses. Cornish game hens weigh no more than 2 pounds ready-to-cook.

*Coverts*—the feathers covering the base of the primary and secondary wing and main tail feathers.
Crest—a round tuft of feathers on the top of the head of some chickens and ducks.

Crop—the enlarged part of the gullet, between the neck and body, in which food is stored temporarily and softened for digestion.

Crossbreed—the offspring of parents of different breeds

Crow Head—a narrow, shallow head with an abnormally long beak.

Culling—removing unproductive or inferior birds from the flock.

Cushion—a mass of feathers over the back and base of the tail of a chicken, giving it a rounded effect.

Cuticle—a protective covering over the shell of the egg which partially seals the pores and makes the shell more water-resistant.

Debeak—the removal of part of the beak of birds to reduce picking and egg eating.

Defect—a fault that is considered in judging poultry.

Disqualification—a serious deformity or a defect which prevents a bird from receiving an award.

Down—the soft, fine, fluffy covering of a young bird.

Dubbing—trimming the comb and/or wattles.

Earlobe—a round, fleshy patch of bare skin on each side of the head, varying in size, shape and color according to the breed.

Embryo—the developing bird within the egg.

Eviscerate—to remove the contents of the body cavity when processing poultry.

Fowl—a collective term applying to chickens, ducks, geese, turkeys and sometimes other avian species. Also a marketing term used for mature chickens.

Fryer (Broiler)—a young, meat-type chicken, usually processed at 7 to 10 weeks of age.

Giblets—the heart, liver and gizzard of poultry when used for meat.

Hackle—the rear and side neck feathers of a bird.

Hen—a female of many avian species. Also a female chicken over 1 year of age.
**Leader Notes**

*Hen-Feathered*—a male having oval instead of pointed sex feathers in the hackle, saddle, wingbow and sickles.

*Hock*—the joint between lower thigh and shank.

*Horn*—a term used to describe the various shades of dark color in the beak of some breeds such as the Rhode Island Red.

*Incubation*—applying heat to eggs to cause them to hatch.

*Keel*—the lower portion of the breast bone.

*Lacing*—a narrow border of contrasting color around the entire web of a feather.

*Leg*—the upper and lower thigh and shank in the live bird. The thigh and drumstick in processed poultry.

*Lopped Comb*—a comb which falls over to one side.

*Luster (Sheen)*—a glossy appearance to the feathers, due to the reflection of light rays.

*Molt*—the process of shedding old feathers and regrowing new ones.

*Mottling*—spots of a color or shades different from the base color of the feather.

*Oil Gland*—a gland on the back at the base of the tail that secretes an oily fluid used in preening the bird’s feathers.

*Ovary*—the part of a hen’s reproductive system that produces the female germ cell and the yolk of the egg.

*Oviduct*—the part of the hen’s reproductive system that produces the white, shell membranes and shell of the egg.

*Plumage*—the collective term for the feather covering of a bird.

*Poultry*—a general term applied to all domesticated fowl.

*Primaries*—the long, stiff feathers growing from outer segments of the wing.

*Pubic Bones*—the thin, rear portion of the hip bones that form part of the pelvis.

*Pullet*—a female chicken less than 1 year old.

*Roach Back*—a deformed, humped back.
**Roaster**—A young, meat-type chicken, usually processed at 3 to 4 months of age.

**Saddle**—the rear of the back of a male fowl.

**Scales**—the thin, horny growths covering the shanks and feet.

**Secondaries**—the long, stiff wing feathers growing from the wing segment next to the primaries.

**Sex Feathers**—the pointed feathers in the hackle, back, saddle, sickles and wingbow of a male fowl. In females, these sex feathers are oval.

**Shank**—the portion of the leg between the hock joint and the foot.

**Sickles**—the long, curved feathers of a male chicken’s tail.

**Side Sprig**—a pointed growth on the side of a single comb.

**Slipped Wing**—a wing that is carried so the primary feathers do not overlap properly when folded.

**Split Wing**—a wing with a distinct gap between the primary and secondary feathers, due to the permanent absence of a feather.

**Spurs**—a bony growth from the rear inner side of the shanks.

**Standard Fowl**—the large or regular-sized breeds of poultry.

**Strain**—fowl of any breed or variety that have undergone a breeding and selection program for a number of years so they reproduce with uniform characteristics.

**Stub**—a short feather, usually found on the shanks, or on or between the toes.

**Texture**—the condition or size of the grain and quality of the skin of the comb, face, wattles and earlobes.

**Thumb Print**—a disfiguring indentation on the blade of a single comb.

**Ticking**—specks or small spots of color in contrast to the base feather color. Ticking can be required on some portions of some breeds, but it may cause disqualification in others.

**Type**—the general shape and form common to all fowl in a breed.

**Undercolor**—the color of the lower or fluff portion of feathers.

**Variety**—a subdivision of a breed, distinguished by color, color pattern or comb type.
Leader Notes

Vent—the single body opening in birds, used to both discharge the waste products of digestion and the eggs or sperm from the reproductive tract.

Wattles—the fleshy, red growths that hang below the side and base of the chicken’s beak.

Wry Tail—the tail of a fowl permanently carried to one side.

Domestic Waterfowl and Turkey Terms

Bean—a raised, hard, bean-shaped swelling on the end of the bill of waterfowl.

Beard—a small cluster of coarse black hairs growing from the upper part of the breast of adult male turkeys.

Bill—the horny mouthparts of waterfowl.

Caruncles—the fleshy growths of naked portions of the head and neck of the turkey and Muscovy duck.

Dewlap—a growth of skin hanging from under the upper bill and throat of some breeds of geese (a dewlap-like skinfold in turkeys is usually called a wattle or throat wattle).

Drake—a male duck.

Duck—name for many smaller species of the waterfowl family; also female duck.

Duckling—a young duck.

Fryer-Roaster—a young turkey usually processed at 12 to 14 weeks.

Gander—a male goose.

Goose—name for many larger species of the waterfowl family; also female goose.

Gosling—a young goose.

Knob—a knob-shaped growth at the base of the upper bill in African and Chinese breeds of geese.

Poult—a young turkey.

Sex Feathers—the feathers in the tail of male duck (except Muscovy breed) which curl upward and forward.
Snood—a tube-like fleshy growth near the front of the top of the head in turkeys.

Tom—a male turkey.

Web—the skin growing between the toes of waterfowl.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. Which method of learning terms in this lesson was most difficult? Why?
2. What method of learning do you enjoy most? Why?

**Process:**
3. Why is it important to use different learning methods?
4. Why do you think specific poultry terminology is important?

**Generalize:**
5. What did you learn about yourself as you tried different learning techniques?
6. What other activities do you do at school, home, etc., where specific terminology is needed?

**Apply:**
7. What are some hobbies or careers that might require an understanding of a lot of specific terms?

**GOING FURTHER:**
- Attend a 4-H Poultry Quiz Bowl.
- Participate in a poultry judging contest and give oral reasons.
- Watch a poultry judge explain placings at a poultry show.
- Make a poster of poultry terms and share at next club meeting or your school class.
REFERENCES:

Author:
Adapted from Minnesota 4-H Animal Science Project Meeting Guide by James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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114-Poultry Science, Level II
Poultry Breed Characteristics

What Members Will Learn . . .

ABOUT THE PROJECT:

• Physical traits and characteristics associated with 10 individual breeds or varieties of poultry
• Three to five breeds or varieties for each purpose (meat, egg or dual purpose production, plus exhibition)
• Origin of 10 different breeds and varieties of poultry

ABOUT THEMSELVES:

• Differences between people with different heritage and ethnic backgrounds

Materials Needed:

• Index cards with names of species, breeds, varieties and place of origin
• Pictures of various species, breeds and varieties
• Chalkboard or large piece of paper and marker to keep score
• American Standard of Perfection (use to get information on breeds, varieties, etc)

ACTIVITY TIME NEEDED: 30 MINUTES

ACTIVITY:

During today’s meeting, we are going to practice our skills in identifying species, breeds and varieties. We will see if we can select breeds according to their best purpose. We will also learn where some of the poultry species and breeds originated.

CHICKENS

The domesticated chicken was derived from the Wild Jungle Fowl, which still exists in a wild state in India and adjacent countries.

The Standard of Perfection, which is used to judge poultry at shows, classifies purebred chickens in the following categories.

Class—the class a chicken belongs in is determined by the geographical area of the world in which it was developed. There are 12 classes of chicken; most of the breeds and varieties raised in the United States belong to the American, English, Mediterranean, Asiatic or Continental classes.

Breed—a breed is a group of birds that possess common distinctive characteristics such as body shape. There are 60 breeds of chickens.
Leader Notes

**Variety**—a variety is a subdivision of a breed that differs from another variety of the same breed by comb type (single, pea, rose), feather color (white, red, buff), or feather pattern (barred, spangled, laced). An example is the Leghorn breed, which contains 12 different varieties that differ by feather color or comb type. There are 175 varieties of chicken.

Poultry is also classified by the intended use of the birds. The major types are:

**Egg-type** are small-bodied chickens that have been selected for maximum egg production. The Single Comb White Leghorn is the main producer of white-shelled eggs in the United States, and the Rhode Island Red is the major producer of brown-shelled eggs.

**Meat-type** are large bodied, fast growing and heavily muscled chickens. The major breeds used in the production of meat-type chickens (broilers) are the White Plymouth Rock and the White Cornish.

**Dual-purpose** breeds of chickens have been bred for both egg and meat production. Examples are the Plymouth Rock, New Hampshire, Rhode Island Red and crosses between these breeds.

**Exhibition or Fancy type** are breeds and varieties developed for show. Many of these birds are bantams, which are one-fourth to one-third smaller in size than their normal counterparts.

**Strains.** As the industry has become more specialized, emphasis has shifted from development of new breeds and varieties to improvement of strains within breeds and varieties. A strain is a flock that has been closed to new bloodlines for several generations. Many strains are named after the original developer of the strain. Most commercial egg- and meat-type stocks are strain crosses.

**Relay ID Game**—you can have members take turns reading off clues, or you as leader can do this. If you have a large group, you may want to divide into several teams of two or three members. Give each player or team one point for each correct answer. Do not deduct points for incorrect answers. Some methods you may want to use in this game are: (a) read breeds and variety and have members tell whether they are for meat production, dual-purpose, egg production or exhibition; (b) read purposes of poultry and have members name breeds and varieties that fit into these categories or (c) name a species of poultry and have members match breed, variety names and place of origin.

<table>
<thead>
<tr>
<th>Class</th>
<th>Skin Color</th>
<th>Earlobe Color</th>
<th>Egg shell Color</th>
<th>Main Use</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>Yellow</td>
<td>Red</td>
<td>Brown</td>
<td>Meat, egg</td>
<td>Plymouth Rock, New Hampshire, Rhode Island Red</td>
</tr>
<tr>
<td>English</td>
<td>Yellow/White*</td>
<td>Red</td>
<td>Brown</td>
<td>Meat, egg</td>
<td>Cornish, Australorp</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>Yellow/White</td>
<td>White</td>
<td>White</td>
<td>Egg</td>
<td>Leghorn</td>
</tr>
<tr>
<td>Asiatic</td>
<td>Yellow</td>
<td>Red</td>
<td>Brown</td>
<td>Show</td>
<td>Brahma, Cochin</td>
</tr>
<tr>
<td>Continental</td>
<td>White</td>
<td>White</td>
<td>White</td>
<td>Show</td>
<td>Hamburg, Polish, Houdan, Sebright</td>
</tr>
</tbody>
</table>

*The Cornish has yellow skin, while the Australorp has white skin.*
TURKEYS
The turkey is a native of North America. Historical evidence indicates the Spanish explorers introduced the North American wild turkey into Europe. Several varieties developed from the stocks brought to the United States by the European immigrants. These stocks have provided the genetic base for present varieties.

Characteristics of the More Common Breeds and Varieties of Turkeys

<table>
<thead>
<tr>
<th>Variety</th>
<th>Primary Feather Color</th>
<th>Main Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Breasted Bronze</td>
<td>Bronze and Black</td>
<td>Meat, show</td>
</tr>
<tr>
<td>Large White</td>
<td>White</td>
<td>Meat</td>
</tr>
<tr>
<td>Beltsville Small White</td>
<td>White</td>
<td>Meat</td>
</tr>
<tr>
<td>Bourbon Red</td>
<td>Red</td>
<td>Show</td>
</tr>
<tr>
<td>Narragansett</td>
<td>Black</td>
<td>Show</td>
</tr>
</tbody>
</table>

DUCKS
All breeds of ducks, except the Muscovy, most likely were derived from the Wild Mallard. The Muscovy is a native of South America and has a different genetic origin than the other breeds.

Characteristics of the More Common Breeds of Ducks

<table>
<thead>
<tr>
<th>Variety</th>
<th>Primary Feather Color</th>
<th>Main Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pekin</td>
<td>White</td>
<td>Meat, show</td>
</tr>
<tr>
<td>Muscovy</td>
<td>White &amp; Black varieties</td>
<td>Meat, show</td>
</tr>
<tr>
<td>Rouen</td>
<td>Multi-colored</td>
<td>Meat, show</td>
</tr>
<tr>
<td>Call</td>
<td>Various colors (varieties)</td>
<td>Show</td>
</tr>
<tr>
<td>Runner</td>
<td>Various colors</td>
<td>Eggs, show</td>
</tr>
<tr>
<td>Khaki Campbell</td>
<td>Light Brown</td>
<td>Eggs, show</td>
</tr>
</tbody>
</table>

GEESE
The common breeds of geese in the United States were imported from Europe and Asia. Most of the breeds originated from the wild gray goose.
## Characteristics of the More Common Breeds of Geese

<table>
<thead>
<tr>
<th>Variety</th>
<th>Primary Feather Color</th>
<th>Main Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toulouse</td>
<td>Gray</td>
<td>Meat</td>
</tr>
<tr>
<td>Embden</td>
<td>White</td>
<td>Meat</td>
</tr>
<tr>
<td>African</td>
<td>Brown</td>
<td>Show</td>
</tr>
<tr>
<td>Chinese</td>
<td>White &amp; brown varieties</td>
<td>Show, Weeders</td>
</tr>
</tbody>
</table>

### DIALOGUE FOR CRITICAL THINKING:

#### Share:
1. What species of poultry do you enjoy? Why?

2. What breed or variety are most common in each species?

#### Process:
3. What are the three main purposes for raising poultry?

4. Which purpose of poultry is most common in your area? Why?

#### Generalize:
5. Poultry classes are determined by geographic regions of the world. How does that compare to the different cultures represented by people who live in your community?

6. What are some neat aspects of various cultures?

#### Apply:
7. Why is it important to know about and understand other cultures?

### GOING FURTHER:
- Read about various species and breeds of poultry and trace their origin.
- Give a talk to your club or class about the origin and characteristics of your favorite breeds of poultry.
REFERENCES:
American Standard of Perfection, American Poultry Association, Box 351, RD #4, Troy, New York, 12180
The Bantam Standard, American Bantam Association, Box 610, N. Amherst, Massachusetts, 01059
Poultry Science Manual, A.W. Adams, Department of Animal Sciences & Industry, Kansas State University, Manhattan, Kansas, 66506

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Pigeon Breeds and Varieties

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
- Five breeds and varieties of pigeons
- To identify physical traits of pigeons

ABOUT THEMSELVES:
- Symbolic uses of pigeons or doves
- An understanding of figures of speech

Materials Needed:
- Large sheet of paper and marking pens
- Pictures of pigeons or live pigeons
- Activity Sheet 13, Pigeon Parts
- Leader’s key, Activity Sheet 13, Pigeon Parts
- Activity Sheet 14, Pigeon Breeds
- Leader’s key, Activity Sheet 14, Pigeon Breeds

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Pigeons are very versatile birds. They are used for the sport of racing as flyers and performers, for showing, for carrying messages and also for meat production. The term pigeon is used to name any bird in the pigeon and dove family. The larger birds are called pigeons, and the smaller birds are called doves.

Pigeons have a plump body, a small head, and short, sturdy legs. Pigeons are extremely powerful and fast flyers because they have large flight muscles in their chest. Their feathers are stiffer and smoother than those of most other birds. Pigeons vary in size. Most species will measure from about 10 to 15 inches long. The largest species is the crowned pigeon and it measures almost 3 feet long and weighs approximately 2 to 3 pounds. The smallest pigeon grows only about 6 inches long and weighs about 1 ounce.

Domestic pigeons are known to be the descendants of wild pigeons. The various domestic breeds and varieties we see today have evolved from the breeders’ selection during breeding.

Pigeons have been a fascination since 5000 B.C. The Bible makes many references to pigeons and doves. In many cases, pigeons and doves symbolize love and peace. Pigeons may be found throughout the world.

Leader Notes

Ask members to list why people might raise pigeons. List their answers on the large sheet of paper.

Hand out Activity Sheet 13, Pigeon Parts, and ask members to identify body parts. Show pictures or examples of different breeds or varieties of pigeons and ask members to identify them. List key identifying characteristics for each breed or variety.

A resource that defines the parts of birds and other details is the Indiana 4-H Pigeon Resource Manual (4-H 742). Copies may be purchased from the Purdue Media Distribution Center, 301 South Second Street, Lafayette, Indiana 47905.
and have gone through many physical changes through selective breeding practices. There are now more than 200 breeds.

Characteristics that help to distinguish between breeds include size, shape, behavior, stance, feather form, colors, markings and ornamentation. Most pigeons have dull-colored feathers that are black, blue, brown or gray. Most male and female feathers look alike, except the male feathers are a little larger and brighter in color.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. What pigeon parts were hard to identify? Why?
2. What pigeon breeds are most common in your area? Why?

**Process:**
3. Why can pigeons fly faster than other domestic birds?
4. What are some characteristics that help distinguish between pigeon breeds? Which are most common?

**Generalize:**
5. What are some symbols pigeons or doves represent?
6. How have pigeons been used by people over time?

**Apply:**
7. What are some symbols represented by other birds or animals?
8. What are some common phrases or figures of speech that refer to pigeons or birds? (Be prepared to talk about the positive and negative affects of these sayings.)

**GOING FURTHER:**
- Read a book about pigeons and share what you learned with your class or club.
- Visit a museum that has a display of pigeons and compare the differences and similarities between breeds.
- Visit a breeder of pigeons and discuss his or her breeding practices.
REFERENCES:
The Pigeon, Levi
Poultry Science, Ensminger
Raising Pigeons, MF 987, Kansas State University

Author:
Cynthia R. Siemens, Extension Assistant, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

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PIGEON BREEDS AND VARIETIES
POULTRY, LEVEL II
Activity Sheet 13, Pigeon Parts

Write the correct word with the identified part.

Wing Parts:
1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
Write the correct word with the identified part.

- Crown
- Eye
- Eye-core
- Ear feathers
- Nape
- Hackle
- Shoulder
- Saddle
- Back
- Rump with upper tail coverts
- Wing flights
- Main tail feathers
- Abdomen
- Hock
- Shank
- Hind or first toe
- Vent
- Crop
- Breast
- Inner or second toe
- Middle toe
- Claw
- Outer or fourth toe

Wing
1. Wrist or wing butt
2. Lesser coverts
3. Middle coverts
4. Second wing bar
5. First wing bar
PIGEON BREEDS AND VARIETIES
POULTRY, LEVEL II
Activity Sheet 14, Pigeon Breeds

Match the name of the pigeon breed with the matching picture or diagram.

Racing Homer
Fantail
Roller
Helmet
Mondain
Jacobin
Indian Fantail
Modena
Trumpter
Swallow
King

Think Back:
What are some of the common characteristics of all breeds and varieties of poultry?
PIGEON BREEDS AND VARIETIES
POULTRY, LEVEL II
Leader’s Key, Activity Sheet 14, Pigeon Breeds

Match the name of the pigeon breed with the matching picture or diagram.

Racing Homer
Fantail
Roller
Helmet
Mondain
Jacobin
Indian Fantail
Modena
Trumpter
Swallow
King
Selecting Poultry for Show

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:

• Standards for breeds of poultry according to their purpose
• Characteristics of birds to be evaluated by the judge using the American Standard of Perfection

ABOUT THEMSELVES:

• Personal strengths and weaknesses, and how they can improve

Materials Needed:

• American Standard of Perfection
• Live birds of various qualities or bird model
• Member Handout 13, Poultry Disqualifications and Defects
• Activity Sheet 15, Self Evaluation

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

As fair time approaches, you need to start looking at your birds and choosing the best ones to exhibit. What are some of the characteristics you would look for in a bird at the fair?

The judge has a guideline to look for in judging a live bird, just as your teachers have guidelines when grading your papers in school. The guideline judges use is called the Standard of Perfection. Inside this book is a list of all the recognized breeds and varieties of poultry and their specific characteristics.

The judge uses the Standard of Perfection to identify a breed of poultry. It tells him/her what color the bird’s feathers should be, how much it should weigh, what color its beak and legs should be, what type of comb it should have, plus some other descriptions.

When you select the bird you want to exhibit at a poultry show, you should look for a bird out of your flock that comes as close as possible to meeting the description listed. You also need to examine your bird for any defects or physical features that will disqualify it from receiving an award.

When you choose a bird for show, look at the shape and appearance of its beak, comb, color of feathers, size and shape of feathers, color of earlobes, weight, etc. A bird may be disqualified from the show or top award if it does not meet the guidelines listed in the Standard of Perfection.
It’s a good idea to select the birds you plan to exhibit at least two weeks before the show, so you have enough time to examine the birds for disqualifications or defects. You also need to pay attention to the bird’s health. You don’t want to exhibit a sick bird.

Look over your flock when it is gathered in the poultry house or yard and make a preliminary selection of several birds. Choose about three times as many birds as you intend to enter. Observe them carefully for two or three days before making your final choice.

**CLASSES OF POULTRY**
Most shows such as county and state fairs will have two broad divisions: production and exhibition.

**Production**
Enter birds in this classification if their primary purpose is for egg or meat production. Egg-type and dual-purpose birds should be exhibited only as trios of pullets or hens. Meat-type (broilers, roasters, capons) birds should be exhibited as trios of either sex. Judging is on their production qualities only.

For egg production classes, select birds that are as uniform as possible and matched with respect to size, head type, plumage color, shank color, state of maturity, etc. Select birds of good production type; normal size; well-feathered; free of serious physical defects (crooked beaks, deformed legs, crooked keels); and vigorous, healthy and alert.

When you select pullets, choose those birds that show characteristic femininity, refinement and sexual maturity as indicated by enlargement and redness of the comb and wattles. Pullets should be free of signs of old age. The ideal pullets to be exhibited should be near or in the early stages of egg production.

Select hens that show superior present and past egg-production as indicated by the condition of their comb, wattles, eyes, pubic bones, abdomen and vent. Also consider degree of bleaching and status of molt. If you are going to exhibit meat production birds, select birds that are as uniform as possible in size, body conformation, fleshing and finish (fat covering). Select birds that are well-feathered and free from defects, such as breast blisters and callouses, curved and crooked breast bones, bruises, cuts and tears, and hunched backs. Fleshing and finish develop with age, so older birds will have more desirable meat qualities than younger birds.

**Exhibition**
Standard bred (normal size) and bantam breeds of chickens, ducks and turkeys should be entered in the young and old classes of exhibition poultry. Chickens are classified by age as follows: cock and hen—birds hatched prior to the current calendar year; or cockerel and pullet—birds hatched during the current calendar year. These birds should be purebreds that have been selected for exhibition qualities. Exhibition birds are usually exhibited as a single male or female.
Exhibition birds should have the best body type for the breed, be uniform in color, have well-developed bodies and well-developed but not worn or ragged feathers, be healthy and free from physical defects, have the correct breed characteristics and be free from disqualifications.

A **disqualification** is a physical defect that prevents a bird from being considered for an award. Some common general disqualifications are:

1. Crooked or crossed beak; crooked breast bone, legs or seriously crooked toes; roached or deformed back.

2. Side sprigs (extra points) on comb, split (divided) comb; comb foreign to the breed.

3. Unacceptable coloring of the earlobe, face, shanks, or feathering according to breed standards.

4. Stubs (small feathers) on legs or between toes of other than Asiatic breeds.

5. Wry tail (off to one side) and a split wing.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**

1. What traits are most important when selecting the best bird of your preferred breed? Why?

2. What are the most difficult traits to identify? Why?

**Process:**

3. What are the differences between production and exhibition classes?

4. What are some general disqualifications?

**Generalize:**

5. What do you use as your standard for measuring who is a good friend?

**Apply:**

6. How important is your first impression when meeting new people?

7. How will you use your personal strengths and weaknesses to improve your personality or character in the future?

**GOING FURTHER:**

- Attend a poultry show, watch and listen to a judge.
- Participate in a poultry judging school or contest.
REFERENCES:
A Guide in Selecting and Preparing Poultry for Show, L-171, Kansas State University

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University
SELECTING POULTRY FOR SHOW
POULTRY, LEVEL II
Member Handout 13, Poultry Disqualifications and Defects

Common Defects and Disqualifications
A defect is anything short of perfection. The cut for a defect should depend on its severity and how it compares to the severity of a defect or deformity that bars a bird from an award. This is called a disqualification. Following is a list of the major disqualifications by categories. Consult the Standard for a more detailed list and description.

Shape
Back: crooked, roached, or deformed.
Beak: deformed in chickens and turkeys.
Beard and muffs: absence of beard and muffs in bearded varieties, and presence of a beard in non-bearded varieties.
Bill: scooped or deformed in ducks and geese.
Body: crooked keel or breast bone in all breeds of turkeys and Cornish chickens.
Comb: one foreign to the breed or variety; a rose comb so large or lopped it obstructs the sight; absence of spike or more than one on a rose comb; a pea comb lopped below the horizontal where the bend occurs, except where this condition is a breed characteristic; a split comb with a side sprig; a cushion comb with a spike or spikes.
Crest: absence of crest or lopped crest.
Neck: pendulous crop in turkeys.
Plumage: hen feathering in males of all breeds except Sebright.
Shanks and toes: all breeds—bow legs; deformed foot or foot joint; duck foot in land fowl; enlarged and misshapen shank or hock; knock knee; web foot in land fowl; more or less than correct number of toes; absence of spurs in Old English and Sumatra cocks; presence or evidence of any down, stub, feather, or part of feather from shank below the hock joint, or foot or toe, on clean-legged breeds; shanks not feathered down outer sides of feather-legged breeds.
Tail: all breeds—complete absence of tail feathers (except Araucanas); one or more reserve tail feathers; split tail in cock and hen; squirrel (except Japanese bantams), and wry tail.
Wings: all breeds—twisted primary or secondary feather (except in Sebastapol geese and Frizzle chickens); split wings; slipped wing; one or more reversed main wing feathers; and one or more primary or secondary feathers with a split quill; clipped primary or secondary feathers in all breeds of chickens and turkeys, and all breeds of waterfowl except Canada and Egyptian geese, and Muscovy, East India, Call and Mallard ducks; inverted wingtips in all breeds of ducks and geese.

Color
Bill: black in bill or bean of white-colored drakes; more than 10 percent black in bill or bean of ducks.
Earlobes: white in red-earlobed breeds.
Face: white in red-earlobed breeds.
Plumage: red or yellow in all barred, black and mottled varieties; black in quills and primaries and secondaries and foreign color (except slight gray ticking) in all white varieties.
Shanks and toes: color foreign to the breed, except slight reddish in tinge of pigment in yellow shanks.
SELECTING POULTRY FOR SHOW
POULTRY, LEVEL II
Activity Sheet 15, Self Evaluation

List your personal strengths and weaknesses and how you feel you can improve

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<th>Strengths:</th>
<th>How to improve:</th>
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<th>Weaknesses:</th>
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Poultry Grooming

*Poultry, Level II*

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- Three grooming techniques used by chickens
- The purpose of each grooming technique

**ABOUT THEMSELVES:**
- What they do to maintain personal body hygiene
- Grooming practices they do for social reasons
- Why their personal appearance is important to them

**Materials Needed:**
- Small Farm Flock
- Pencil and writing pad
- Activity Sheet 16, Observing Poultry Grooming Habits

**ACTIVITY TIME NEEDED:** 45 MINUTES

**ACTIVITY:**

Animals groom themselves, as we do, except in different ways. The object of their grooming is much the same as ours, to clean themselves and make them attractive to others of their species.

There are three basic types of grooming by birds. **Dust bathing** is practiced by birds that are allowed on the ground. It involves the birds resting on an area where the soil is dusty. By fluffing their feathers, dust particles are spread over their body surfaces. This process has a soothing effect and, in some cases, is useful in controlling external parasites such as lice. **Preening** involves the bird using its beak or bill to spread oil secreted by the oil gland (located on top of the tail) onto the feathers. The oil maintains the luster of the feathers and improves the water resistance of the feathers. **Feather pecking** can be either a grooming activity or a cannibalistic activity. Feather pecking is a grooming activity when a bird pecks or grooms the feathers of penmates. In contrast, feather pecking becomes a cannibalistic activity when damage is done to the skin or feathers of the bird that is being pecked.

**Leader Notes**

Observe a group of birds in an area where they can be viewed and not disturbed. This could be a loafing pen or run attached to a building. Sit and watch the birds. What activities are observed? Make a list on the activity sheet of each grooming activity and what its function/reason might be.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What types of grooming did you observe in the flock?

2. What types of grooming occurred most often? Why?

Process:
3. When birds picked at the top of their tail, what were they doing? Why?

4. Why do birds groom themselves?

Generalize:
5. Why are good grooming habits important to you? (Consider health and appearance.)

6. How do you decide what style of grooming to use?

Apply:
7. When does grooming for health reasons conflict or agree with social appearance? Why?

8. How do you think your grooming habits will change as you get older? Why?

GOING FURTHER:
- Read a book on poultry behavior.
- View a video or movie on some aspect of poultry behavior.

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Reviewed by:
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POULTRY GROOMING
POULTRY, LEVEL II
Activity Sheet 16, Observing Poultry Grooming Habits

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<tr>
<th>Activity</th>
<th>Function/Reason</th>
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Poultry Showmanship

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT

• Five parts of a bird examined during showmanship
• Characteristics defining quality and condition of a bird
• How to take waterfowl from a cage

ABOUT THEMSELVES:

• How they feel about presenting themselves for examinations
• How they feel about the impressions they make with friends and others

Materials Needed:

• Tables and cages
• Live bird
• Wood shavings
• Paper to cover table
• A judge
• Member Handout 14, Poultry Handling Positions
• Member Handout 15, Scorecard for Poultry Showmanship

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Most showmanship events involve demonstrating these procedures when requested by the judge.

HOLDING AND CARRYING THE BIRD

To carry a bird, you should keep the body balanced and upright on the palm of the same hand which was used to remove the bird from the cage. The head and neck may extend between the arm and body of the person carrying it or, with a small bird, against the carrier’s body and above the arm on which it is carried. The other hand should rest on the bird’s back.

EXAMINATION AND HANDLING

Birds should be held upright to give the judge a side view of the body. The bird should rest comfortably on the palm of the holder’s hand. The strengths of the bird should be emphasized: tails fluffed, head and beak raised, feathers smoothed, wings tucked in normal position. In this basic hand-posed position, the participants will be asked to show the judge several parts of the bird.

Leader Notes

Set up a practice contest with a member as the judge and a team of two members to show a bird. After the members have attempted to perform each task, ask each pair to demonstrate one of the tasks for the entire group.
Head—The bird should be raised to shoulder height and turned so the head and face can be examined. The hand supporting the bird should remain in place, while the free hand moves the head. Complete the examination by turning the bird to examine the other side of the head and face.

Wings—Spread wings to examine condition and pattern of the feathers. To extend the first wing, grasp wing tip with free hand and pull. To examine second wing, place free hand across body of bird and apply pressure to last wing joint with thumb and fingers of free hand to extend the wing.

Undercolor—The undercolor of the back and body fluff of the birds will be examined. Use finger tips to gently pull tops of feathers against the grain. This action exposes portions of feathers normally hidden from view.

Width of Body—Width of body is determined by placing the thumb and index fingers of free hand across the bird’s body directly behind the bases of the wings. Gently push the measuring arch, thus formed downward to the tail, to determine the width and shape of the body.

Breast—Without changing the grip, examine the breast by holding the bird so its head is downward and its back is directly against the body of the showman. The showman’s free hand should be used to measure the breast bone and examine the keel for straightness, breast blisters, indentations or other defects. In this position the depth of the body or distance between the keel and back may also be determined.

Depth of Abdomen—After examining the vent, measure the depth of the abdomen by placing as many fingers of the free hand as possible between the tip of the keel and the pubic bones.

Pubic Bones—The width between the pubic bones is determined by placing as many fingers of the free hand as possible between the tips of these bones.

Feet and Legs—To examine the feet and legs, the bird is held against the showman’s body. The free hand should be used to manipulate feet and legs so all parts can be examined. Swivel the bird to examine the front of the feet and legs.

PERSONAL APPEARANCE OF MEMBERS
Each contestant should be neatly dressed in clean, well-pressed clothes. No uniform is required, but no shorts or cut-offs should be worn. Personal grooming is particularly important.
QUALITY AND CONDITION OF THE BIRD
When selecting a bird, whether it’s a male or large female bird, a bantam, a duck, a goose or a turkey, the following characteristics should be considered:

- Pleasing appearance—bright eyes, good fleshing, free from defects
- Good, smooth plumage—shiny appearance, clean and washed if appropriate for species
- Breed and varietal characteristics
- Free from diseases and parasites
- Gentle and not flighty—usually a bird that is worked with over a period of time will become accustomed to the showmanship routine and will show its strongest characteristics while being judged. A radio played near the bird will also help familiarize it with show conditions. A short practice session just before the contest is also suggested to help calm both bird and exhibitor.

KNOWLEDGE OF POULTRY TERMS
The judge will ask the participants to explain various poultry terms and their relationship to the bird and the poultry project.

TURKEY AND WATERFOWL SHOWMANSHIP HINTS
Turkey and waterfowl are shown similar to chickens. The only major difference occurs when waterfowl are taken out of the cage. The correct procedure is as follows:

Open cage door. Grasp large duck’s or goose’s neck (loosely) and turn bird toward cage door. Pull out of cage, head first. At the same time, slide second hand beneath the bird’s body, placing fingers between the bird’s legs and grasping them so the bird, when lifted, can be balanced on the palm of that hand. Place first hand on bird’s back and wings.

All other procedures will be the same as for chickens. When taking out very small ducks, such as bantam ducks, the same procedure as for chickens may be used. Ducks and geese should never be caught by the legs.

DIALOGUE FOR CRITICAL THINKING:
Share:
1. What happened the first time you attempted to properly hold and carry a bird?

2. What examination position was the most difficult? Why?

Process:
3. What are some of the parts of a bird to examine during showmanship? Why do you think these parts were selected?

4. What differences in handling are there for turkeys and waterfowl? Why?
Leader Notes

Generalize:
5. How important is your personal appearance when showing poultry? Why?

6. When have you had to present yourself for inspection or examination? Why?

Apply:
7. What do you do to present your best qualities to others?

8. How important do you think a good impression will be when interviewing for a job in the future? Why?

REFERENCES:
Preparing for 4-H Poultry Showmanship, Agricultural Extension Service, University of Minnesota
The Standard of Perfection, American Poultry Association, 26363 S Tucker Road, Estacada, Oregon 97023
Judging Poultry at the County Fair, L-772, Kansas State University
A Guide in Selecting and Preparing Poultry for Show, L-771, Kansas State University

Author:
Adapted from Preparing for 4-H Poultry Showmanship, Agricultural Extension Service, University of Minnesota by Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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POULTRY SHOWMANSHIP
POULTRY, LEVEL II
Member Handout 14, Poultry Handling Positions

Holding

Carrying

Wing Examination

Head Examination

Under Color
POULTRY SHOWMANSHIP
POULTRY, LEVEL II
Member Handout 14, Poultry Handling Positions, *continued*

Think Back:
Why is doing and looking your best important? List times when it is extremely significant.
POULTRY SHOWMANSHIP
POULTRY, LEVEL II
Member Handout 15, Scorecard for Poultry Showmanship

Exhibitor Number: ________________________

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<tr>
<th>Possible Points</th>
<th>Points Awarded</th>
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<tbody>
<tr>
<td>10</td>
<td>1. Introduction</td>
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<tr>
<td>20</td>
<td>2. Grooming and condition of bird</td>
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<td></td>
<td>3. Routine in any order should be smooth</td>
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<td>5</td>
<td>A. Examination of head, wattle, etc.</td>
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<td>5</td>
<td>B. Wings, color pattern, condition of feathers, check for lice or mite damage.</td>
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<td>5</td>
<td>C. Show width of back, undercolor.</td>
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<td>5</td>
<td>D. Check keel bone, breast, feather color, undercolor.</td>
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<td>E. Feet, toes, shank.</td>
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<td>F. Tail, proper carriage, condition</td>
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<td>G. Place bird on table and pose for judge.</td>
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<td>4. Exhibitor’s appearance and attitude</td>
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<td>15</td>
<td>5. Exhibitor’s speaking ability and knowledge of the subject.</td>
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<tr>
<td>100</td>
<td>Total</td>
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Basic Egg Cookery

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- The nutritional value of eggs
- The functional properties eggs contribute in food preparation
- Various methods of cooking eggs
- Proper egg handling and care

**ABOUT THEMSELVES:**
- How important they believe eggs are in their diet
- How they feel about the functional properties of eggs
- To what extent they think they will use eggs in the future

**Materials Needed:**
- Eggs
- Ingredients and cooking equipment are required for the recipe(s) that will be used
- Member Handout 16, Nutrient Density of the Egg
- “Kids in the Kitchen” and “Basic Egg Cookery” from the Kansas Poultry Association
- Activity Sheet 17, Egg Dish and Properties Word Match
- Leader’s Key, Activity Sheet 17, Egg Dish and Properties Word Match

**ACTIVITY TIME REQUIRED:** 60 MINUTES

**ACTIVITY:**

Eggs are hard to beat for easy preparation, great versatility and delicious eating. Eggs are also one of nature’s most nourishing foods, since they contain a wide array of necessary nutrients that both chicks and humans need.

Egg protein is of such high quality that it is often used as the standard by which other protein is measured. Egg protein contains all of the essential amino acids (building blocks of protein that the body needs but cannot make) in a pattern that closely matches the pattern the body needs. That is why eggs are classified with meat in the basic food groups and why egg protein is called a complete protein.

Foods that supply significant amounts of one or more nutrients compared to the number of calories they supply are called nutrient dense. Eggs have a high nutrient density because they provide excellent protein and a wide range of vitamins and minerals in proportion to their calorie count. For example, one large egg provides 15 percent of the U.S. Recommended

**Leader Notes**

Ask members to name the four main food groups and indicate which group eggs belong in.
Daily Allowance for protein; equals 1 ounce of lean meat, fish or poultry; contains varying amounts of vitamins (but no vitamin C) and minerals; and contains only 80 calories. An egg yolk is one of the few foods which contain vitamin D, the sunshine vitamin.

In addition to their nutritional qualities, eggs are used in cooking because of their varied functional properties. Examples of an egg’s functional properties are:

1. **Foaming or leavening**—air bubbles are trapped in liquid egg white when it is beaten. The beaten white becomes foamy, increases six to eight times in volume, and stands in peaks. When the foam is heated, the tiny air cells expand and the egg protein coagulates around them, giving permanence to the foam. Egg white foam is responsible for the structure of souffles, angel food cakes, puffy omelets, and meringue. Fat inhibits the foaming of egg white, so be sure beaters and bowls are clean and there is not a trace of yolk in the whites.

2. **Thickening**—when eggs are added to pumpkin pies, custards and sauces, heating coagulates the protein, causing the mixture to become thicker.

3. **Coating**—eggs are added to batters that meat, French toast, and vegetables are dipped in prior to deep-fat frying. The egg increases the ability of the batter to stick to the food.

4. **Emulsification**—a component in an egg, called lecithin, helps to stabilize emulsions or mixtures of liquids, such as mayonnaise, salad dressings, and Hollandaise sauce, so the various ingredients do not separate.

5. **Garnishing**—eggs can be hard cooked and used as a garnish on salads.

There are five basic methods for cooking eggs: **baked** (also known as shirred); **cooked in the shell** (eggs in their shells cooked in water) either hard-cooked or soft-cooked; **fried; poached** (eggs cooked out of the shell in hot water, milk, broth or liquid); and **scrambled**.

The basic principle of egg cooking is to use a medium to low temperature and time carefully. When eggs are cooked at too high a temperature, whites shrink and become tough and rubbery; yolks become tough, and their surface may turn gray-green. Eggs other than hard-cooked should be cooked until the whites are completely coagulated and the yolks start to thicken.
Before you start to cook:
- Wash your hands!
- Wear an apron if you have one.
- Read the recipe and get the food and utensils you will need.
- Be sure to use only microwave-safe dishes when you cook in the microwave.
- When you uncover a hot pan or dish, lift the back edge of the lid or plastic wrap first.
- Use pot holders to move hot pans or dishes.
- Don’t forget to clean up!

The same nutrient qualities that make eggs a high-quality food for humans can also be a good growth medium for bacteria that cause food poisoning. In addition to food, bacteria also need moisture, a favorable temperature (between 40° and 140°F), and time to multiply to large enough numbers to cause illness. By using good hygiene, refrigeration, cooking and handling practices, you can ensure that your eggs will maintain their high quality and safety for use in dozens of ways.

**DIALOGUE FOR CRITICAL THINKING:**

**Share:**
1. How often do you eat eggs? Why?
2. What egg cooking method do you use most/least? Why?

**Process:**
3. Why is an egg nutrient dense?
4. What is significant about the functional properties of eggs?

**Generalize:**
5. What is your favorite use of eggs? Why?
6. How important are eggs in your diet? Why?

**Apply:**
7. How important is food safety when using eggs compared to other foods?
8. How will ease of cooking affect your use of eggs in the future?

**GOING FURTHER:**
- Discuss the issue of fats and cholesterol as it relates to eggs.
- Prepare a talk or demonstration about eggs to share with classmates or other audiences.
- Visit a restaurant to see how eggs are used or to determine the most popular uses.
REFERENCES:
*Kids in the Kitchen, Basic Egg Cooking, Answers to Often-Asked Questions About Eggs,* and *Eggcyclopedia,* American Egg Board leaflets, 1460 Renaissance Drive, Park Ridge, Illinois, 60068, or the Kansas Poultry Association, 225 Call Hall, Manhattan, KS 66506-0202

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

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BASIC EGG COOKERY
POULTRY, LEVEL II
Member Handout 16, Nutrient Density of the Egg

Percentage of U.S. Recommended Daily Allowances (US RDA) provided by 1 large egg

PROTEIN ................................................................. 15%
VITAMIN A .............................................................. 6%
VITAMIN C ......................................................... LESS THAN 2%
THIAMINE ............................................................... 2%
RIBOFLAVIN ............................................................. 15%
NIACIN .............................................................. LESS THAN 2%
CALCIUM .............................................................. 2%
IRON ........................................................................ 4%
VITAMIN D ............................................................. 6%
VITAMIN E ............................................................. 2%
VITAMIN B6 .............................................................. 4%
FOLIC ACID ........................................................... 6%
VITAMIN B12 ........................................................... 8%
PHOSPHORUS .......................................................... 8%
IODINE ................................................................. 15%
MAGNESIUM ......................................................... LESS THAN 2%
ZINC ........................................................................ 4%
 COPPER ................................................................. LESS THAN 3%
BIOTIN ................................................................. 4%
PANTOTHENIC ACID ..................................................... 6%

80 CALORIES (4% OF DAILY INTAKE ON AN 1800 CALORIE DIET)

5 GRAMS OF FAT (1 GRAM POLYUNSATURATED, 2 SATURATED, 2 MONOUNSATURATED)
Match the functional properties of eggs with the correct egg dish. Match all that apply.

<table>
<thead>
<tr>
<th>Functional Property</th>
<th>Egg Dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulsification</td>
<td>Meringue, Angel food cake</td>
</tr>
<tr>
<td>Foaming</td>
<td>Pumpkin pie</td>
</tr>
<tr>
<td>Thickening</td>
<td>Custard</td>
</tr>
<tr>
<td>Garnish</td>
<td>Souffle</td>
</tr>
<tr>
<td>Coating</td>
<td>Mayonnaise, Salads</td>
</tr>
</tbody>
</table>
Match the functional properties of eggs with the correct egg dish. Match all that apply.

<table>
<thead>
<tr>
<th>Functional Property</th>
<th>Egg Dish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulsification</td>
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<tr>
<td>Garnish</td>
<td>Custard</td>
</tr>
<tr>
<td>Coating</td>
<td>Souffle</td>
</tr>
<tr>
<td></td>
<td>Meat batter</td>
</tr>
<tr>
<td></td>
<td>Mayonnaise</td>
</tr>
<tr>
<td></td>
<td>Salads</td>
</tr>
</tbody>
</table>
Ethnic Recipes for Omelets

Poultry, Level II

What Members Will Learn . . .

ABOUT THE PROJECT:
- How to read and follow a recipe
- To observe and demonstrate how to make a two-egg omelet
- To learn about the nutritional value of an egg
- To compare the differences between high- and low-quality omelets and scrambled eggs

ABOUT THEMSELVES:
- Their feelings about other cultures and ethnic groups related to omelet fillings

Materials Needed:
- Eggs
- Cooking utensils required for preparing omelets
- Recipes for various types of omelets
- A good appetite
- Member Handout 17, Omelets

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY:

Whether you prefer the French spelling “omelett” or the all-American “omelet,” an omelet is easy to make. It is beaten eggs cooked in a pan, then rolled or folded—usually around a filling, and, sometimes, with a topping. Since the filling can be almost anything you like, an omelet is one of the most versatile dishes in a cook’s recipe collection.

The ancient Romans supposedly made the first omelet, and, because it was sweetened with honey, called it omemele (egg and honey). Some insist this was the origin of the word omelet. Others maintain the word was derived from omelett (French) meaning blade, describing the long, flat shape of an omelet.

Whatever its origin, an omelet can hold or be topped with any food from caviar to leftover meatloaf, vegetables, etc. The possibilities of fillings and toppings are only limited by your imagination and the contents of your refrigerator. In fact, the main difference between omelets in different cultures is the fillings that are used.

An omelet can be a down-home main dish served on everyday stoneware, or it can be filled with fancy foods from the gourmet section and served on china. For any meal of the day, an omelet is easy to adapt to suit your
taste, time table and budget. The three basic omelets are the French omelet (plain), the basic French (plain) microwave omelet, and the basic puffy (souffle) omelet.

Omelets are easy and quick to prepare and are very economical. A plain omelet takes only about one to two minutes to prepare on top of the range. Or, if you like, use the microwave for the added convenience of no-stir cooking. If a dozen large eggs costs 90 cents a dozen or 60 cents a pound, the egg in a two-egg omelet costs 15 cents.

Making an Omelet is Easy—Follow These Simple Steps

- Cooking an omelet requires very little equipment: an 8- to 10-inch diameter no-stick pan, a mixing bowl, an egg whip, a plastic spatula, and a serving dish.
- Prepare the fillings before starting to cook the eggs. Heat refrigerator-cold ingredients to serving temperature or fully cook raw foods before you begin cooking the omelet.
- Use 1 tablespoon of water for each egg. Water is recommended for omelets because the high heat used in cooking omelets will break down the protein in milk resulting in a flat texture rather than the desired fluffiness. Use water for omelets, milk for scrambled eggs.
- Beat eggs, water, salt and pepper until blended.
- Heat the omelet pan over medium-high heat until pan is hot enough to sizzle a drop of water. Add a pat of butter or teaspoon of vegetable oil to the pan. Pour in egg mixture.
- With an inverted spatula or pancake turner, carefully push cooked portions at edges toward center of pan so uncooked portions can reach hot surface at edge of pan. Tilt pan and move cooked portions as necessary.
- While the top is still moist and creamy-looking, but not runny, fill the omelet (on left side if right-handed, vice versa if left-handed).
- After filling omelet, fold in half or roll with spatula. Invert (flip over) omelet onto plate with a quick flip of the wrist or slide from pan onto plate. Flipping omelet over hides those tears that may occur when you fold the omelet over.

Proper care and handling of eggs and egg dishes is very important to prevent food infections. Follow these steps to assure proper care and handling:

1. Hold eggs or egg dishes at below 45°F or above 140°F.
2. Wash hands before preparing omelets.
3. Use only clean, uncracked eggs.
4. Use clean, sanitized utensils and equipment.
5. Cook omelet thoroughly.
6. Never leave egg dishes at room temperature for more than 1 hour.
DIALOGUE FOR CRITICAL THINKING:

Share:
1. What did you like about making an omelet? Why?
2. What was the most difficult part of making an omelet?

Process:
3. What are the differences between omelets and scrambled eggs?
4. What is significant about omelet fillings?

Generalize:
5. What cultures or ethnic groups could you study because of omelet fillings?

Apply:
6. How will you act differently in the future as a result of learning to make omelets?
7. What will you do differently the next time you make omelets?

GOING FURTHER:
- Demonstrate how to make an omelet before your club.
- Prepare different types of omelets using different fillings.
- Prepare a flaming dessert omelet.
- Organize and hold an omelet party for a special event of your club or as a fund raising project. Equipment for such an event is available from the Kansas Poultry Association, 1816 Alabama, Manhattan, Kansas 66502, (785) 539-5441.

REFERENCES:
Omelets, and Basic Egg Cooking, Kansas Poultry Association, 1816 Alabama, Manhattan, Kansas 66502, or American Egg Board, 1460 Renaissance, Park Ridge, Illinois, 60068
Flaming Dessert Omelet, Kansas Poultry Association, 255 Call Hal, Manhattan, Kansas 66506-0202
Leader Notes

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

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158-Poultry, Level II
ETHNIC RECIPES FOR OMELETS
POULTRY, LEVEL II
Member Handout 17, Omelets

NUTRITION INFORMATION PER SERVING
1 Large Egg (50g edible portion)

Calories ....................................................... 80
Protein ........................................................ 6 g
Carbohydrates less than ......................... 1 g
Fat (Percent of Calories - 56%) ............ 5 g
    Polyunsaturated .................................... 1 g
    Saturated ............................................... 2 g
    Monounsaturated .................................. 2 g
Cholesterol .......................................... 215 mg
Sodium .................................................. 65 mg

Percentage of U.S. Recommended
Daily Allowances (U.S. RDA)

Protein ............... 15  Vitamin B6 ............ 4
Vitamin A .......... 6  Folic Acid ............... 6
Vitamin C .......... *  Vitamin B12 .......... 8
Thiamine ..........  2  Phosphorus ............  8
Riboflavin .......... 15  Iodine ................... 15
Niacin .............. *  Magnesium ............ *
Calcium ..........  2  Zinc .......................  4
Iron .................  4  Copper ................... *
Vitamin D ..........  6  Biotin ....................  4
Vitamin E ..........  2  Pantothenic Acid ...  6

*Contains less than 2% of the U.S. RDA of these nutrients

Making an omelet is easy!

Beat
Pour
Push
Tilt
Fill
Serve
The Diet Balancing Act With Poultry Products

*Poultry, Level II*

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- The food guide pyramid and its role in human nutrition
- The nutrients found in the food pyramid
- To identify examples of foods that provide these nutrients
- To identify the role of poultry products in a balanced diet

**ABOUT THEMSELVES:**
- The adequacy of their diet
- What adjustments are needed in their food habits

**Materials Needed:**
- Member Handout 18, Food Nutrient Check-Off
- Member Handout 19, Food Guide Pyramid
- Member Handout 20, Nutritive Value of Selected Foods
- Member Handout 21, Recommended Daily Dietary Allowances for Humans

**ACTIVITY TIME NEEDED:** 45 MINUTES

**ACTIVITY:**

Food alone cannot make you healthy. But healthful eating habits, which include moderation and a variety of foods, can help. Many American diets have too many calories and too much fat, cholesterol and sodium, and too little complex carbohydrates and fiber.

These six dietary guidelines are recommended for good health.

1. **Eat a variety of foods.** Because no one food contains all the nutrients, it is necessary to eat a variety of foods within the food pyramid—dairy products, fruits, vegetables, grains and meat/eggs.

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Major Contribution to Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products</td>
<td>Protein, vitamins A &amp; D, riboflavin, calcium, phosphorous</td>
</tr>
<tr>
<td>Fruits</td>
<td>Fiber, vitamins A &amp; C, minerals, folic acid</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Fiber, vitamins A &amp; C, various minerals</td>
</tr>
<tr>
<td>Grains</td>
<td>Protein, carbohydrates, fiber, iron, B-complex vitamins</td>
</tr>
<tr>
<td>Meat and eggs</td>
<td>Protein, B-complex vitamins, iron, zinc</td>
</tr>
</tbody>
</table>

Eggs and poultry are part of the meat group. Roasted, skinless poultry meat has less fat (calories) and cholesterol than other meats.

Leader Notes

Give members Member Handout 19, Food Guide Pyramid. Have members list examples of foods for each section.

Use Member Handout 20, Nutritive Value of Selected Foods. Prepare a visual showing the major nutrients eggs and chicken contribute to the diet.
2. **Maintain a healthy weight.** What weight is right for you? There is no definite answer to this question because youth come in all sizes and shapes. Children need energy to grow and develop normally. Overweight or underweight children may need help in choosing nutritious diets.

3. **Choose a diet low in fat, saturated fat and cholesterol.** Eating less fat makes sense because fat is linked with being overweight. A diet high in fat gives more energy than you need, but often less of other nutrients. Skinless poultry meat and eggs are high in protein and low in fat.

4. **Choose a diet with plenty of vegetables, fruits, and grain products.** These foods are especially important for their starches and fiber, and are generally low in fat.

Many egg dishes combine a variety of different foods, including those high in starch and fiber. For example, omelets and souffles can use foods from the meat, milk, fruit and vegetable groups. Quiches can use foods from all these groups, including the grain (bread) group.

5. **Use sugars only in moderation.** Sugars are widespread in nature, occurring in fruits, vegetables, honey, legumes, grains and milk. Table sugar and sugar from corn syrups provide most of the sugar in the average diet. Many snack foods and beverages that are high in sugar have a low protein, vitamin and mineral content.

Sugar and starch (which breaks down into sugar) are sources of energy, but contain few other nutrients. Eating foods that contain large amounts of sugar and starch should be avoided because they may keep you from eating more nutritious foods, and can contribute to tooth decay and being overweight. Desserts containing eggs as the main ingredient are relatively low in sugar.

6. **Use salt in moderation.** Salt is essential in the diet. However, most Americans consume more salt than they need. Snack foods, such as chips, crackers, pretzels, and nuts, are high in salt. Unsalted eggs and poultry meat are naturally low in salt.

**DIALOGUE FOR CRITICAL THINKING:**

Share:
1. What is one new fact you learned from this lesson?

2. What would you like to know more about? Why?

Process:
3. Why is it important to eat a variety of foods?

4. Why are vegetables, fruits and grains so important?
Generalize:
5. Which of the six dietary guidelines are most critical for your age? Why?
6. What basic food group do you have the most trouble including in your diet? Why?

Apply:
7. What will you do differently in the future as a result of this lesson?
8. What, besides the food you eat, influences your health? How?

GOING FURTHER:
• Keep a record for several days of the types of foods you eat. Are you getting a well-balanced diet?

REFERENCES:
The Balancing Act, Egg Nutrition Center, 2301 M Street, NW, Suite 405, Washington, DC 20037
Nutritive Value of Foods, USDA Home and Garden Bulletin, Number 72

Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

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## THE DIET BALANCING ACT WITH POULTRY PRODUCTS

### POULTRY, LEVEL II

**Member Handout 18, Food Nutrient Check-off**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Chicken</th>
<th>Eggs</th>
<th>Fruits and Vegetables</th>
<th>Dairy Products</th>
<th>Grains</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-Vitamins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Under each food item, check the major nutrients it supplies to your diet.
THE DIET BALANCING ACT WITH POULTRY PRODUCTS
POULTRY, LEVEL II
Member Handout 19, Food Guide Pyramid

Fats, Oils & Sweets
Use Sparingly

Bread, Cereal, Rice & Pasta Group
6–11 Servings

Fruit Group
2–4 Servings

Vegetable Group
3–5 Servings

Milk, Yogurt & Cheese Group
2–3 Servings

Meat, Poultry, Fish, Dry Beans, Eggs & Nuts Group
2–3 Servings

Bread, Cereal, Rice & Pasta Group
6–11 Servings

Fat (naturally occurring and added)

Sugar (added)

These symbols show fats, oils and added sugars in foods.

165-Poultry, Level II
# THE DIET BALANCING ACT WITH POULTRY PRODUCTS

## POULTRY, LEVEL II

Member Handout 20, Nutritive Value of Selected Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Energy</th>
<th>Protein</th>
<th>Fat</th>
<th>Ca</th>
<th>P</th>
<th>Iron</th>
<th>Sodium</th>
<th>Vit A</th>
<th>Thiamin</th>
<th>Riboflavin</th>
<th>Niacin</th>
<th>Ascorbic Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reg Cola (12 oz)</td>
<td>160</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>52</td>
<td>.2</td>
<td>18</td>
<td>0</td>
<td>.10</td>
<td>.40</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>Milk, 2% (1 cup)</td>
<td>120</td>
<td>8</td>
<td>5</td>
<td>297</td>
<td>232</td>
<td>.1</td>
<td>122</td>
<td>500</td>
<td>.10</td>
<td>.40</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>Ice Milk, 4% (1 c)</td>
<td>185</td>
<td>5</td>
<td>6</td>
<td>176</td>
<td>129</td>
<td>.2</td>
<td>105</td>
<td>210</td>
<td>.08</td>
<td>.35</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>Egg, lg, fried</td>
<td>95</td>
<td>6</td>
<td>7</td>
<td>29</td>
<td>91</td>
<td>1.1</td>
<td>162</td>
<td>320</td>
<td>.04</td>
<td>.14</td>
<td>Trace</td>
<td>0</td>
</tr>
<tr>
<td>Fishstick (4&quot;x1&quot;x ½&quot;)</td>
<td>70</td>
<td>6</td>
<td>3</td>
<td>11</td>
<td>58</td>
<td>.3</td>
<td>53</td>
<td>20</td>
<td>.03</td>
<td>.05</td>
<td>.6</td>
<td>.0</td>
</tr>
<tr>
<td>Apple, raw (2 ¼ diam)</td>
<td>80</td>
<td>Trace</td>
<td>Trace</td>
<td>10</td>
<td>10</td>
<td>.2</td>
<td>Trace</td>
<td>70</td>
<td>.02</td>
<td>.02</td>
<td>.1</td>
<td>8</td>
</tr>
<tr>
<td>Orange, raw (1 cup)</td>
<td>85</td>
<td>2</td>
<td>Trace</td>
<td>72</td>
<td>25</td>
<td>.2</td>
<td>Trace</td>
<td>370</td>
<td>.16</td>
<td>.07</td>
<td>.5</td>
<td>96</td>
</tr>
<tr>
<td>Bread, wheat (1 slice)</td>
<td>65</td>
<td>2</td>
<td>1</td>
<td>32</td>
<td>47</td>
<td>.9</td>
<td>138</td>
<td>Trace</td>
<td>.12</td>
<td>.08</td>
<td>1.2</td>
<td>Trace</td>
</tr>
<tr>
<td>Oatmeal, (1 cup)</td>
<td>145</td>
<td>6</td>
<td>2</td>
<td>19</td>
<td>178</td>
<td>1.6</td>
<td>2</td>
<td>40</td>
<td>.26</td>
<td>.05</td>
<td>.3</td>
<td>0</td>
</tr>
<tr>
<td>Cheerios (1 ¼ cup)</td>
<td>110</td>
<td>4</td>
<td>2</td>
<td>48</td>
<td>134</td>
<td>4.5</td>
<td>307</td>
<td>1250</td>
<td>.37</td>
<td>.43</td>
<td>5.0</td>
<td>15</td>
</tr>
<tr>
<td>Lucky Charms (1 cup)</td>
<td>110</td>
<td>3</td>
<td>1</td>
<td>32</td>
<td>79</td>
<td>4.5</td>
<td>201</td>
<td>1250</td>
<td>.37</td>
<td>.43</td>
<td>5.0</td>
<td>15</td>
</tr>
<tr>
<td>Donut, glazed (1)</td>
<td>235</td>
<td>4</td>
<td>13</td>
<td>17</td>
<td>55</td>
<td>1.4</td>
<td>222</td>
<td>Trace</td>
<td>.28</td>
<td>.12</td>
<td>1.8</td>
<td>0</td>
</tr>
<tr>
<td>Peanuts, salted (1 cup)</td>
<td>840</td>
<td>39</td>
<td>71</td>
<td>125</td>
<td>734</td>
<td>2.8</td>
<td>626</td>
<td>0</td>
<td>.42</td>
<td>.15</td>
<td>21.5</td>
<td>0</td>
</tr>
<tr>
<td>Hamburger, 4 oz</td>
<td>445</td>
<td>25</td>
<td>21</td>
<td>75</td>
<td>225</td>
<td>4.8</td>
<td>763</td>
<td>160</td>
<td>.38</td>
<td>.38</td>
<td>7.8</td>
<td>1</td>
</tr>
<tr>
<td>Chicken breast, fried (3.5 oz)</td>
<td>220</td>
<td>31</td>
<td>9</td>
<td>16</td>
<td>228</td>
<td>1.2</td>
<td>74</td>
<td>50</td>
<td>.08</td>
<td>.13</td>
<td>13.5</td>
<td>0</td>
</tr>
<tr>
<td>Candy, milk choc (1 oz)</td>
<td>145</td>
<td>2</td>
<td>9</td>
<td>50</td>
<td>61</td>
<td>.4</td>
<td>23</td>
<td>30</td>
<td>.02</td>
<td>.10</td>
<td>.1</td>
<td>Trace</td>
</tr>
<tr>
<td>Green beans (1 cup)</td>
<td>25</td>
<td>2</td>
<td>Trace</td>
<td>35</td>
<td>26</td>
<td>1.2</td>
<td>339</td>
<td>470</td>
<td>.02</td>
<td>.08</td>
<td>.3</td>
<td>6</td>
</tr>
<tr>
<td>Carrot, raw (1)</td>
<td>30</td>
<td>1</td>
<td>Trace</td>
<td>19</td>
<td>32</td>
<td>.4</td>
<td>25</td>
<td>20,250</td>
<td>.07</td>
<td>.04</td>
<td>.7</td>
<td>7</td>
</tr>
<tr>
<td>Corn, canned (1 cup)</td>
<td>165</td>
<td>5</td>
<td>1</td>
<td>11</td>
<td>134</td>
<td>.9</td>
<td>571</td>
<td>510</td>
<td>.09</td>
<td>.15</td>
<td>2.5</td>
<td>17</td>
</tr>
<tr>
<td>Potato chips (10)</td>
<td>105</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>31</td>
<td>.2</td>
<td>94</td>
<td>0</td>
<td>.03</td>
<td>Trace</td>
<td>.8</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Nutritive Value of Foods, USDA, Home and Garden Bulletin, Number 72, Revised 1981
THE DIET BALANCING ACT WITH POULTRY PRODUCTS
POULTRY, LEVEL II
Member Handout 21, Recommended Daily Dietary Allowances (RDA) for Humans

Designed for the maintenance of good nutrition of practically all healthy persons in the United States.

<table>
<thead>
<tr>
<th>Sex-age category</th>
<th>Persons</th>
<th>Food energy</th>
<th>Protein</th>
<th>Minerals</th>
<th>Vitamin A</th>
<th>Thiamin</th>
<th>Riboflavin</th>
<th>Niacin</th>
<th>Ascorbic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Kilo-grams</td>
<td>Centi-</td>
<td>Calories</td>
<td>Grams</td>
<td>Milli-</td>
<td>Milli-</td>
<td>Milli-</td>
<td>Inter-</td>
<td>Milli-</td>
</tr>
<tr>
<td>From To</td>
<td>Pounds</td>
<td>Inches</td>
<td></td>
<td></td>
<td>grams</td>
<td>grams</td>
<td>grams</td>
<td>nation-</td>
<td>grams</td>
</tr>
<tr>
<td>Infants</td>
<td>0 0.5</td>
<td>6 13</td>
<td>60 24</td>
<td>kg × 115 lb × 52.3</td>
<td>kg × 2.2 lb × 1.0</td>
<td>360</td>
<td>240</td>
<td>10 420</td>
<td>1,400</td>
</tr>
<tr>
<td>Children</td>
<td>1 3</td>
<td>13 29</td>
<td>90 35</td>
<td>kg × 105 lb × 47.7</td>
<td>kg × 2.0 lb × 0.9</td>
<td>540</td>
<td>360</td>
<td>15 400</td>
<td>2,000</td>
</tr>
<tr>
<td>Males</td>
<td>11 14</td>
<td>45 99</td>
<td>157 62</td>
<td>2,700</td>
<td>45 1,200 1,200 18 1,000</td>
<td>5,000</td>
<td>1.4</td>
<td>1.6</td>
<td>18 50</td>
</tr>
<tr>
<td>Females</td>
<td>11 14</td>
<td>46 101</td>
<td>157 62</td>
<td>2,200</td>
<td>46 1,200 1,200 18 800</td>
<td>4,000</td>
<td>1.1</td>
<td>1.3</td>
<td>15 50</td>
</tr>
<tr>
<td>Pregnant</td>
<td>+300</td>
<td>+30</td>
<td>+400</td>
<td>+400</td>
<td>+1.8+</td>
<td>+200</td>
<td>+1,000</td>
<td>+.4</td>
<td>+.3</td>
</tr>
<tr>
<td>Lactating</td>
<td>+500</td>
<td>+20</td>
<td>+400</td>
<td>+400</td>
<td>+18</td>
<td>+200</td>
<td>+2,000</td>
<td>+.5</td>
<td>+.5</td>
</tr>
</tbody>
</table>

1. Source: Adapted from Recommended Dietary Allowances. 9th ed., 1980. 185 pp. Washington DC: National Academy of Sciences, National Research Council. Also available on libraries. This publication tabulates the RDA for selected nutrients, discusses the basis for all RDA and reviews current knowledge of the dietary needs for other nutrients.
2. 1 retinol equivalent = 1 µg retinol or 6 µg beta-carotene.
3. 1 international unit = 0.3 µg retinol or 0.6 µg beta-carotene.
4. After age 75 years, energy requirement is 2,050 calories for males and 1,600 calories for females.
5. The increased requirement cannot be met by ordinary diets, therefore the use of supplemental iron is recommended.

Note—The Recommended Daily Dietary Allowances (RDA) should not be confused with the U.S. Recommended Daily Allowances (U.S. RDA). The RDA are amounts of nutrients recommended by the Food and Nutrition Board of the National Research Council and are considered adequate for maintenance of good nutrition in healthy persons in the United States. The allowances are revised from time to time in accordance with newer knowledge of nutrional needs.

The U.S. RDA are the amounts of protein, vitamins and minerals established by the Food and Drug Administration as standards for nutrition labeling. These allowances were derived from the RDA set by the Food and Nutrition Board. The U.S. RDA for most nutrients approximates the highest RDA of the neo-age categories in this table, including the allowances for pregnant and lactating females. Therefore, a diet that furnishes the U.S. RDA for a nutrient will furnish the RDA for most people and more than the RDA for many. U.S. RDA are protein, 45 grams (eggs, fish, meat, milk, poultry) 65 grams (other foods); vitamin A, 5,000 International Units; thiamin, 1.5 milligrams; riboflavin, 1.7 milligrams, niacin, 20 milligrams; ascorbic acid, 60 milligrams; calcium, 1 gram; phosphorus, 1 gram; iron 18 milligrams. For additional information on U.S. RDA, see the “Federal Register,” vol. 38, no.49 (March 14, 1973), pp. 6959-6960, and Agriculture Information Bulletin 362, “Nutrition Labeling—Tools for Its Use.”
Use of Poultry Products
*Poultry, Level II*

**What Members Will Learn . . .**

**ABOUT THE PROJECT:**
- The difference between edible and nonedible poultry products
- Five edible uses of poultry products
- Five nonedible uses of poultry products
- Five nonedible uses of egg byproducts

**ABOUT THEMSELVES:**
- Their feelings about the value of poultry products in their daily lives
- Their feelings about the importance of recycling poultry wastes

**Materials Needed:**
- Magazines and newspapers containing advertisements that depict different poultry products

**ACTIVITY TIME NEEDED:** 45 MINUTES

**ACTIVITY:**

Poultry products are either **edible** (fit for human consumption) or **nonedible** (not fit for human consumption). Although eggs and poultry meat are major parts of the human diet, we also benefit from many nonedible products that are produced by the poultry industry.

**EDIBLE PRODUCTS**

Eggs and poultry meat are classified as a protein food. About 70 percent of the eggs consumed in the US are purchased as shell eggs and served in the fried, hard cooked or scrambled forms. The other 30 percent are used in a wide range of food products because of the egg’s **functional** properties they add to foods. Egg white is used in pie meringues and in angel food cakes because of its **leavening** property, or its ability to make them rise. The egg yolk is used in meatloaf and in coatings on fried chicken because of its **binding** ability. Egg yolk is used in mayonnaise because it adds a natural yellow **color** to the product and because it contains an **emulsifying** agent that keeps the oil and water from separating. Lastly, the egg is used in foods because of its excellent **nutritional** value.

Poultry meat is a very popular item in the American diet because it is economical, highly nutritious and available in many different forms such as parts, ground turkey, breast fillets, etc. These are called **value-added** or **further-processed** products because the processor has increased the product’s value by increasing the convenience of their preparation.
NONEDIBLE PRODUCTS
There are many nonedible products produced by the poultry industry. Although some of these products are still wasted, the industry is making progress in using them.

Poultry manure is in high demand for use as a fertilizer, a feed ingredient and in the production of methane gas. Feathers are used for livestock feed, ornaments, some sporting equipment (arrows), bedding (down-filled blankets) and clothing. Offal which consists of the heads, feet and nonedible internal organs is used in various types of feed. Blood can be used for fish bait, fertilizer and feed. Grease extracted from the offal is used in feed.

Nonedible byproducts from eggs have many uses. The most significant use of eggs other than for human food is for reproduction. Other uses are: the addition of nonedible eggs in pet foods; the production of biological products such as vaccines and growth media for microorganisms; the use of egg yolk in preservation of sperm, tanning of leather, shampoos and lotions; the use of egg white in adhesives; and the use of the intact egg shell as an art medium.

Do at least one of the following activities with your group: (1) visit a supermarket and record as many items as you can that contain poultry products, (2) prepare a scrapbook of product labels or advertisements of edible and nonedible poultry product uses or (3) compare the price per pound of a whole broiler or turkey to that of ground chicken or turkey, chicken patties or chicken or turkey frankfurters. Discuss reasons for differences in prices.
GOING FURTHER:
- Study recycling aspects of poultry manure and share with your group and others.
- Explore how poultry manure is used to produce methane gas.
- Give a presentation on uses of feathers and show examples.
- Give a presentation on egg byproducts and their value to humans.
- Have someone demonstrate the use of an egg shell as an art form.

REFERENCES:
Author:
Albert W. Adams, Professor Emeritus, Poultry Sciences, Kansas State University; James P. Adams, Extension Specialist, 4-H Youth Programs, Kansas State University

Reviewed by:
R. Scott Beyer, Extension Specialist, Poultry Sciences, Kansas State University

Think Back:
What are the nutritional pros and cons of poultry products?
Note: List these on a separate sheet to include in your record book.
Complete step 8 of your Member Guide and Annual Report.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

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