Poultry Leader Guide

4-H

WASHINGTON STATE UNIVERSITY
EXTENSION

EM4887E
Level 4

4-H Poultry Leader Notebook

Level IV

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Game Bird Production

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- Specific management techniques for raising selected game birds
- Marketing strategies
- Specialty markets available
- Hunting and recreation available

ABOUT THEMSELVES:

- Their feelings about hunting (killing or harvesting) nature's game birds
- Their feelings on operating hunting reserves for profit
- Their opinions on raising game birds for specialty food markets

Materials Needed:

ACTIVITY TIME NEEDED: 60–120 MINUTES

ACTIVITY

Leader Notes

Some people raise game birds for their beauty, particularly the more colorful and unusual species. Some states encourage 4-H youth to raise game birds such as ring-necked pheasants for release, to improve the natural population. Also, game birds are raised as a business enterprise. Examples are raising game birds for release on private and/or public hunting areas, or for processing and sale as a gourmet food item.

The species of game birds that can be successfully grown under domesticated conditions are bobwhite quail, ring-necked pheasants, chukar or Hungarian partridges, wild turkeys, and mallard ducks. The ring-necked pheasant and partridge were successfully introduced into the United States from other countries because they were placed in habitats similar to their native countries. Game birds are grown much like chickens and turkeys, except that they require enclosed pens so they can't fly away.

Except for mallard ducks, the main foods of game birds are weed seeds, berries, insects, and green vegetation. Where water is not present, upland game birds obtain their necessary moisture by eating succulent green plants or insects.

The **bobwhite quail** is a very popular game bird. Its exploding flush and fast darting flight make it a challenge to hunters. The bobwhite is mainly a farmland bird preferring a combination of cultivated fields, woodlots, brush, and weed patches for its habitat. Bobwhite quail usually raise one

brood (or family) per summer. The brood remains together through the summer and sometimes joins other broods or individuals to form coveys in the fall. Bobwhite quail weigh 6 to 8 ounces.

Other species of quail found in the United States are the **California** or **valley**, **mountain**, **Gambel's** or **desert**, **scaled** or **blue**, and **Mearn's**. The **Japanese**, **coturnix** or **Pharoah's quail**, is native to Europe and Asia and dates back to the ancient civilizations of those countries. Coturnix quail are easy to raise because they are hardy, easy to handle, and cared for with simple equipment. They have a short reproductive cycle, and may lay eggs when only 35 days old. The adult birds weigh between 4 to 5 ounces. Attempts to establish the specie in the wild have not been successful.

The **chukar** or rock partridge is found in the mountainous states which have an arid mountainous habitat similar to the chukar's native habitat of Europe and Asia. Chukars weigh between 1 and 1¼ pounds. The **gray** or **Hungarian** partridge, sometimes referred to as the "Hun," is found mainly on farmed prairies in the northern United States and southern Canada.

The **ring-necked pheasant** is considered by many people to be the king of game birds, probably because of its size and the beautiful feathers of the male. Farmed prairies are the bird's ideal habitat. It is the easiest game bird to grow under artificial conditions and maintains its wildness. Adult pheasants weigh between 2 and 3 pounds.

The **mallard** duck is the most popular species of waterfowl and the easiest to raise and propagate in captivity. In addition to its ability to adapt to pen conditions, the adult mallard is relatively free of disease and requires a minimum of shelter in the most severe weather. Their acceptance of pen conditions is primarily controlled by the availability of food and water. Mallards are raised primarily for use on shooting preserves.

The **wild turkey** is the largest upland game bird in the United States. An adult gobbler will sometimes weigh more than 20 pounds.

Turkeys were originally found throughout the United States and Mexico. There are six races of wild turkeys with the eastern being the most common. Our present domesticated varieties of turkeys originated from the Mexican race. Spanish explorers took the Mexican race back to Europe. This stock gave rise to several varieties, which were brought to the continent by the settlers. Present-day varieties such as the Broad Breast Bronze were developed from crosses of these varieties and the eastern wild turkey.

Wild turkeys have been successfully introduced into Washington and other parts of the United States. Preferred habitat for the turkey are wooded

areas with scattered openings. Turkeys are polygamous (one male mating with several females) and raise only one brood of young (poults) each year.

Your first decision is to choose a specific bird to study for possible production.

Divide members into groups of two to four and let them select a game bird to study. Each group could plan one activity about its chosen bird to share with the entire group. This could take several meetings.

After you have chosen a species, consider gathering information in these categories:

1. Techniques unique to raising and management of selected bird

2. Marketing strategies
   - Food markets
   - Hunting and recreation possibilities

Consider the following activities for your species:

1. Visit a game bird reserve.

2. Do a grocery store search and list all game bird food items available.

3. Collect breed, extension or other management-type bulletins.

4. Check for slide sets, videos, or movies from extension or public libraries.

5. Visit university or private research facilities.

6. Conduct a discussion with friends or club members on the importance of game birds for recreation.

7. Research specialty markets that might be available.

8. Conduct a discussion on pros and cons of hunting and animal welfare issues.

DIALOGUE FOR CRITICAL THINKING

1. What game bird did you study? Why?
2. What was the most unusual or difficult situation you encountered? Why?
3. What problems seemed to occur in all or most species chosen by your group?
4. Are any of these game bird problems also problems for people? Which ones? Why?
5. How do you feel about hunting game birds? Is this unnecessary killing or is it harvesting to assist the balance of nature? Discuss.
6. How do you feel about raising game birds for fun or profit, or as a food commodity?

GOING FURTHER

1. Give a presentation to civic groups on some game bird issue or topic.
2. Invite a wildlife specialist or game warden to your meeting.
3. Lead a public forum on a game bird issue pertinent to your area.

ABCs of Poultry Genetics

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- Five genetic terms and their definitions
- To identify and define three breeding systems
- To identify and define five selection and culling methods

ABOUT THEMSELVES:

- Why they have different physical characteristics than their peers
- What selection practices they use
- How they feel about the potential for human genetic mating

Materials Needed:

- Pictures of several different breeds and varieties of poultry
- Paper and pencils
- Chalkboard
- Member Handout 1 - "Inheritance Examples"

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

Those engaged in poultry raising must understand the principles of poultry breeding. Knowing these principles will aid in understanding and choosing the right type, strain, breed, and variety of poultry.

Since wild fowl were first domesticated, there have been many changes through selective breeding programs. Most likely chickens were first selected on their fighting ability. Then in the late 1800s, breeders placed major emphasis on the appearance of the birds, such as comb type and feather color. Many of the American breeds and varieties of chickens were developed during this era. In recent years, breeders have placed major emphasis on selection for efficient egg and meat production.

What a bird looks like and how it performs are influenced by the genetic traits it inherits from its parents and the environment in which it lives.

Using pictures or illustrations, have youth discuss differences in the physical appearance of various breeds and varieties of poultry. Have them relate these differences to differences between individuals and between races of people.

Chromosomes are the carriers of **genes,** the basic units of inheritance. Each species of animal has a definite number of chromosomes. The chicken has 39 pairs of chromosomes. Genetic traits may be **dominant** or **recessive**. A dominant gene is one that exerts its influence over its recessive counterpart. Dominance may vary from partial to complete.

Leader Notes

Using Example 1 on Member Handout "Inheritance Examples," illustrate the inheritance of comb type in chickens. Put various genotypes on the chalkboard and have youth determine the various genotypes and phenotypes of the progeny. Genotype refers to the actual gene makeup, while phenotype refers to the physical appearance.

The genetic traits inherited by an individual bird may express themselves in two ways, **physically** or **qualitatively** (those we can see) such as body shape, comb type, and feather color, and **physiologically** or **quantitatively** (those we can't see) such as egg production, growth rate, and broodiness.

Qualitative traits are clearly expressed in the physical appearance of the bird and are usually controlled by one or two pairs of genes. The environment has little influence on the expression of qualitative traits. Following are some important qualitative traits of chickens:

1. **Feather Color.** White or light-colored feathering is very important in the breeding of meat-type poultry because they look cleaner when processed than birds with dark-colored feathers. Mating a dominant white male with a colored female will produce predominantly white-feathered offspring.

2. **Skin Color.** Most breeds and varieties of chickens have either white- or yellow-colored skin. Since most breeds developed in the United States have yellow skin, yellow-skinned broilers are preferred in most markets.

3. **Sex Determination.** Of the 39 pairs of chicken chromosomes, 38 have similar size and shape within pairs and are called autosomes. The other pair contains similar members in the male, (ZZ) chromosomes, and one different member in the female, (ZW) chromosomes. The Z chromosome carries genes just like the autosomes, but the W chromosome carries few or no genes and appears to function primarily in sex determination. Thus, the female bird determines the sex of the offspring.

   Using Example 2 on the Member Handout, illustrate how the gene for barring can be used to sex day-old chicks. Have youth discuss why sexing day-old chicks is desirable. Have youth make the reverse cross and show the various genotypes and phenotypes.

   The lack of a second Z sex chromosome in the female is of some economic importance. Certain traits, such as rate of feathering and some plumage colors (barred, silver, gold), are carried on the Z sex chromosome. These genes are said to be **sex-linked**, and when used in a proper cross can be used to determine the sex of day-old chicks by differences in the appearance of their feathers.

Variability of **quantitative** traits among individuals is measured numerically, such as number of eggs laid per hen or average body weight. Quantitative traits are usually influenced by several pairs of genes. If selection for one trait indirectly improves another trait, the traits have a **positive genetic correlation**. For example, selection for small body size in egg-type chickens improves feed efficiency. A **negative genetic correlation** occurs when improvement in one trait results in deterioration of another trait. Using the previous example, selection for smaller body size would result in smaller eggs.

Performance of poultry is a combination of the influences of **heredity** and the **environment**. **Heritability** is the sum of the genetic forces expressed through a particular gene or combination of genes. The environment is the sum of the nongenetic forces that influence gene expression. Traits with low heritability are greatly influenced by the environment. Examples are fertility and disease resistance. Examples of traits with high heritability are shell color and egg weight.

Selection for egg production and meat production is very complex since it involves continuous selection for improvement in many factors. The primary traits affecting egg production are age at sexual maturity, rate of lay, livability, body size, egg size, egg quality, and shell color. Major traits affecting meat production are rate of growth, body conformation and fleshing, amount and distribution of fat, feathering, feed conversion, and carcass grade and yield.

Poultry breeders use different **breeding systems** to improve the performance of poultry. Most of the systems involve some type of crossing.

1. **Purebreds.** Mating birds of the same breed or variety. Maintenance of purebred lines is essential to supply stocks for other breeding systems.

2. **Inbreeding.** This involves mating closely related individuals such as brother and sister. Its purpose is to expose adverse recessive genes. Inbreeding adversely affects such traits as livability, fertility, and hatchability.

3. **Crossing.** The purpose of crossing is to increase hybrid vigor. **Crossbreeding** involves mating different breeds or varieties such as a Rhode Island Red cockerel and a White Leghorn pullet. **Incrossing** involves crossing two inbred lines of the same breed or variety. **Strain crossing** is the mating of two distinct, non-inbred strains of the same breed or variety. Most commercial chickens and turkeys are produced by strain crossing.

Culling the flock is a very important management tool. It involves the removal of undesirable birds from the flock. Three basic reasons for culling are to salvage the poor producers while they still have some value, to improve the production efficiency of the flock by removal of the loafers, and to prevent the spread of disease. Culling is most commonly practiced in small flocks.

Selection refers to selecting candidates for the breeding flock. Both physical appearance and performance records are used in selection of potential breeders. **Mass selection** is based on selection of desirable individuals without regard to the productivity of their relatives. **Family selection** involves selecting breeders on the basis of their ancestors performance, such as pedigree selection, sibling performance, progeny performance,

or a combination of these. **Index selection** is based on a combination of information from various sources and usually involves individual plus family selection.

DIALOGUE FOR CRITICAL THINKING

1. What physical appearance differences in breeds of chickens do you feel are most highly heritable and are dominant traits?
2. Discuss the differences between genotype and phenotype.
3. If you were to mate a Rhode Island Red male and a Barred Plymouth Rock female, what color would be found in the resulting chicks?
4. What 10 characteristics would you like to see in the "perfect" chicken?
5. What type of selection is practiced among wild birds? Does this type of selection occur among humans?
6. How do you feel about genetic mating of humans? For example, using sperm or an egg from known geniuses in an attempt to have a "super smart" child?
7. How do you think your understanding of genetics will help you in the future?

GOING FURTHER

1. Give a presentation about simple genetics to a group.
2. Visit a poultry breeder and discuss mating systems.
3. Visit a poultry research facility to see what genetic research is being done.

ABCs OF POULTRY GENETICS
POULTRY SCIENCE, LEVEL IV
Member Handout 1

Inheritance Examples

Example 1. Inheritance of comb type in chickens.

Genotypes and phenotypes of parents	Genotypes and phenotypes of progeny
RR (rose) x RR (rose)	RR (rose)*
RR (rose) x rr (single)	Rr (rose) RR (rose)
Rr (rose) x Rr (rose)	Rr (rose) rr (single) RR (rose)
RR (rose) x Rr (rose)	Rr (rose) RR (rose)
Rr (rose) x rr (single) rr (single)	Rr (rose)
rr (single) x rr (single)	rr (single)

* Rose comb is dominant to single comb.

Example 2. Illustration of sex-linked genes in chickens, a Rhode Island cockerel mated to a Barred Rock pullet.

Genotypes and phenotypes of parents	Genotypes and phenotypes of progeny
Rhode Island cockerel x Barred Rock pullet bb (nonbarred) x BW (barred)	Bb (barred)* - all cockerels bW (nonbarred) - all pullets

* Barring is dominant to nonbarring.

Chick Embryo Development

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- How to create an egg window in an incubating egg
- To recognize the heart pulsations in the young chick embryo
- Stages of embryonic development

ABOUT THEMSELVES:

- The embryonic development of the human fetus compared to a chick
- Their feelings about using animals to better understand or benefit humans
- Their feelings about abortion

Materials Needed:

- Fertile chicken eggs which have been incubated 48 hours
- Tweezers
- Scissors
- Cellophane tape or plastic wrap
- Member Handout 2 - "Embryo Development at 5, 10, 15, and 20 Days"
- Member Handout 3 - "Important Events in Embryonic Development"

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Leader Notes

One of the greatest miracles of nature is the rapid transformation of a seemingly lifeless egg into a new, living organism, the chick. The developing chick embryo offers a rare opportunity for you to study the various stages of development in its embryonic growth, such as the early heartbeat or the embryo exercising back and forth in its small encasement.

Since the embryo actually starts to develop with the formation of the egg within the hen's body, it's important to understand the formation of the egg to fully understand embryonic development.

Refer to "Parts of an Egg" illustration. Egg Grading, Level III.

Fertilization takes place as the ovum enters the funnel, or infundibulum, if viable sperm are present. Many sperm contact the germinal disc on the ovum, or yolk, but only one unites with the female germ cell. Thus, fertilization occurs about 24 hours before the egg is laid. Since the fertilized germinal disc or blastoderm spends about 24 hours in the warmth of the hen's body (107°F) while the egg is being formed, a number of cell divisions (4,000 to 6,000) take place before the egg is laid.

If, after the egg is laid, its temperature drops below 80°F, development ceases. Holding fertile eggs at temperatures above 80°F prior to incubation causes slow embryonic growth resulting in a weak embryo and ultimately a poor hatch. Thus, it is necessary to store hatching eggs at temperatures of 60° to 65°F prior to incubation.

The successful structural development of the embryo from a microscopic spot to a structure filling the entire shell depends upon the proper functioning of the processes of respiration, excretion, metabolism, and protection. In observing the living embryo, you should be familiar with the special temporary organs, or embryonic membranes formed within the egg to fulfill these functions. These organs are the **yolk sac, amnion,** and **allantois**.

The **yolk sac** is a vascular membrane growing over the surface of the yolk. Its function is to supply food material to the developing embryo and to the chick the first few hours after it is hatched.

The **amnion** encases the embryo in a colorless fluid, provides protection from mechanical shock, and permits the developing embryo to exercise.

Give each member a copy of "Important Events in Embryonic Development" and "Embryo Development at 5, 10, 15, and 20 Days." Discuss the events and compare to the diagrams.

The **allantois** serves as a respiratory organ and a reservoir for excreta. It absorbs albumen, which serves as a nutrient, and calcium for the structural needs of the embryo.

Activity—Study the Beating Heart

1. By the time the chicken embryo has incubated 48 hours, the first sign of life, the exposed beating heart, is evident to the naked eye.

Have members divide into groups and give each group a 48-hour incubated egg. As you read instructions, have groups prepare the eggs.

2. Carefully crack the blunt or large end of the shell with the heavy end of the tweezers. Flake away a few small pieces of shell. Using the scissors, cut the shell as far down as the inner shell membrane which is the opaque (white) membrane laying on top of the liquid contents of the egg. The outer shell membrane will have been removed with the shell.

3. There may be blood vessels very near to the inner shell membrane. This membrane must be removed carefully in order to not break any of the blood vessels and cause a hemorrhage.

4. As soon as the membrane is successfully removed, you will see a mass of blood vessels covering the yolk and the tiny heart can be seen pulsating with life.

5. If the egg is maintained in the upright position, the heart will continue to beat for several hours even at room temperature.

6. If the opening is covered with plastic wrap or cellophane tape and returned to the incubator in the upright position, the heart may continue to pulsate for some time, perhaps as much as a day.

For all practical purposes, the egg will not hatch after this opening is made as the respiratory balance has been altered. Also, the egg can no longer be turned to facilitate embryonic growth. Experience has indicated, however, that growth may continue for some days. The observer may feel that because the heart can no longer be seen, the embryo may have died, but you should remember that the heart itself is enclosed within the body cavity approximately 72 hours after incubation is started, so it will no longer be visible.

DIALOGUE FOR CRITICAL THINKING

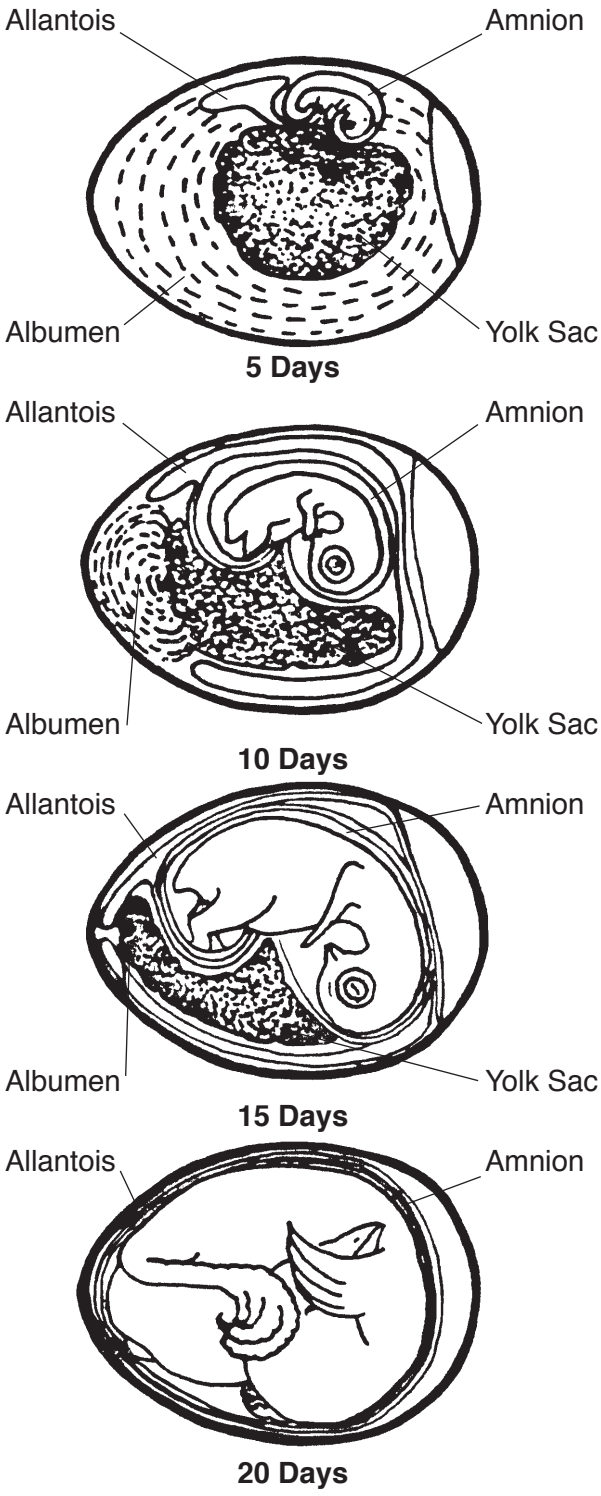
1. What was the most difficult procedure in cutting the window in the egg?
2. When does fertilization of the egg take place?
3. Why is there normally no cell growth in the egg between the time it's laid and when it's put into incubation?
4. How do you feel about observing embryonic development?
5. How do you think human embryo development compares to a chick?
6. Discuss how you feel about using chick embryos to further understand human development.
7. How does this study affect your opinions about abortion?

GOING FURTHER

1. Prepare and present a talk or demonstration on embryo development.
2. Study different stages of embryonic development by examining eggs from different incubation times.
3. Study different incubation periods from different species/breeds.

CHICK EMBRYO DEVELOPMENT
POULTRY SCIENCE, LEVEL IV
Member Handout 2

Embryo Development at 5, 10, 15, and 20 Days



CHICK EMBRYO DEVELOPMENT
POULTRY SCIENCE, LEVEL IV
Member Handout 3

Important Events in Embryonic Development

Before Egg Laying

Fertilization
Division and growth of living cells
Segregation of cells into groups of special function

Between Laying and Incubation

No growth; stage of inactive embryonic life

During Incubation

First Day:	16 hours - First sign of resemblance to a chick embryo. 18 hours - Appearance of alimentary canal. 20 hours - Appearance of vertebral column 21 hours - Beginning of formation of nervous system 22 hours - Beginning of formation of head 23 hours - Appearance of blood islands - vitelline circulation 24 hours - Beginning of formation of eye
Second Day:	25 hours - Beginning of formation of heart 35 hours - Beginning of formation of ear 42 hours - Heart begins to beat
Third Day:	50 hours - Beginning of formation of amnion 60 hours - Beginning of formation of nose 62 hours - Beginning of formation of legs 64 hours - Beginning of formation of wings 70 hours - Beginning of formation of allantois
Fourth Day:	Beginning of formation of tongue
Fifth Day:	Beginning of formation of reproductive organs and differentiation of sex
Sixth Day:	Beginning of formation of beak and eggtooth.
Eight Day:	Beginning of formation of feathers.
Tenth Day:	Beginning of hardening of beak.
Thirteenth Day:	Appearance of scales and claws.
Fourteenth Day:	Embryo turns its head toward the blunt end of egg.
Sixteenth Day:	Scales, claws, and beak becoming firm and horny.
Seventeenth Day:	Beak turns toward air cell.
Nineteenth Day:	Yolk sac begins to enter body cavity.
Twentieth Day:	Yolk sac completely drawn into body cavity; embryo occupies practically all the space within the egg except the air cell.
Twenty-first Day:	Hatching of chick.

Chick Coloring to Observe Feather Growth

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- To illustrate plumage development
- To demonstrate the rate of growth of feathers in the chick

ABOUT THEMSELVES:

- Their feelings about the first impression they make on others
- The value they place on physical appearance

Materials Needed:

- Fertile chicken eggs - white varieties (White Leghorns, White Plymouth Rocks, White Wyandottes, etc.)
- Incubator
- Egg candler
- Small drill, sharp probe, or knife with a good point
- Hypodermic syringe of 1 or 2 cc capacity
- 22-gauge needles, ½ inch long
- Vegetable dyes
- Paraffin, collodion, or cellophane tape
- Tincture of thimerosal (merthiolate) or 95 percent alcohol solution
- Handout 4 - "Cross section of 11-day-old Embryo Showing Site of Injection"

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

Colored chicks are an excellent attraction in a chick display. There are two ways to color chicks: one is dipping the chicks in a warm dye solution; and the other is injecting dye into the embryo prior to hatching. Coloring chicks allows you to study early feather growth. Juvenile plumage will replace the colored down in about two weeks. As this happens, the dyed background amid new growing feathers provides a constantly changing pattern.

Procedure:

1. The eggs should be incubated for 15 days.

2. The eggs should be candled, although this is not absolutely essential. If the eggs are not candled and all eggs are injected with the dye, some of the eggs may have been infertile or the embryos may have died at an early age.

Leader Notes

Break members into groups of two or three. Give each group an egg, syringe, etc., to work on the eggs as you read the instructions.

3. Harmless vegetable dyes, such as food coloring dyes sold in grocery stores, work satisfactorily. Red, green, and blue usually give the cleanest and most distinct results. Coloring by injection of these dyes will not adversely affect the chick.

   Sterilize the small end of each egg by wiping it with the the thimerosal (merthiolate) or alcohol solution. Allow eggs to dry. Place the needle on the hypodermic syringe and draw approximately 1 cc of dye solution into the syringe for each egg to be injected. The amount of liquid is not critical as long as ½ to 1 cc is used for each egg.

4. Drill a small hole, large enough for the needle on the syringe, in the small or sharper end of the egg shell.

5. Insert the needle into the egg being careful not to stick it into the embryo. Usually ¼-to ½-inch penetration into the egg will be sufficient to go into the extra-embryonic membranes. The tissues of the embryo have developed sufficiently that one will be able to "feel" the needle touch the embryo. If this happens, withdraw the needle slightly before injecting the dye. Inject ½ to 1 cc of the dye solution into the egg.

6. Withdraw the needle, wipe off any leakage which may have come from the egg, and seal the hole with a small amount of paraffin, sealing wax, collodion, or tape.

7. Replace the egg in the incubator. Dye injections can be done at any time between the 12th and 17th day of incubation. Injection can of course, be done as late as the 17th or 19th day, but it will be more difficult to inject dyes.

The injected dye will not affect the growth or development of the embryo. It is not necessary to turn the eggs after 14 days of development.

The chicks will lose this dye color within a few weeks after hatching. All that has been colored is the down. When the normal feathers begin to appear, they will have the normal variety coloring as set by the genetic makeup of the individual.

It may be desirable to brood the chicks for a few weeks where they will not disturb the group, but where observations can be made at regular intervals. It is interesting to note the growth pattern of the feathers on the various sections of the body.

Have members keep a log or journal of the feather development of the baby chicks, noting the day the first feathers appear and the day when all the dyed fluff is gone.

The method described in this lesson is labor intensive and time consuming. Another method of dyeing chicks is to dip them in a warm solution of one part dye and three parts water. Add detergent to the water to improve penetration of the solution. Place the chicks under a source of heat after dipping them in the solution. This method will not hurt the chick or affect its growth or appetite.

DIALOGUE FOR CRITICAL THINKING

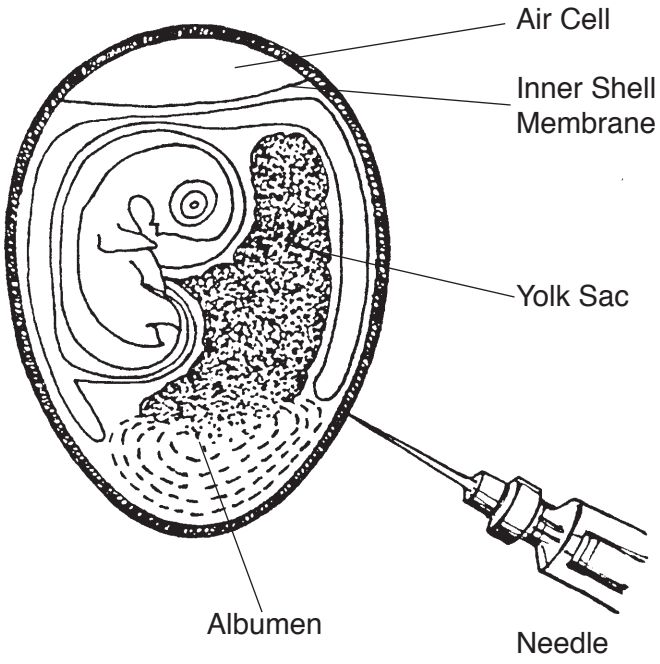
1. What was most difficult to do when coloring chick embryos? Easiest?
2. Why should you not puncture the embryo when injecting the dye?
3. How did you feel about altering the appearance of a chick?
4. How long do you expect the dye to be noticeable after the chick has hatched?
5. How do you feel about altering your appearance? Makeup? Dyeing your hair? Tattoos?
6. How does appearance affect first impression when meeting someone new?
7. What effect does a first impression have on a meaningful, long-term friend relationship?

GOING FURTHER

1. Demonstrate to other groups how to color baby chicks.
2. Have a job recruiter talk to your group about the value of first impressions when interviewing for jobs.

COLORING BABY CHICKS
POULTRY SCIENCE, LEVEL IV
Member Handout 4

Cross-Section of 11-day-old Embryo Showing the Site of Dye Injection.



Reproductive System of the Hen

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- The main parts and functions of a hen's reproductive tract
- How an egg is formed
- Sections of the reproductive tract in which each part of the egg is formed
- How egg defects occur

ABOUT THEMSELVES:

- Their feelings about dissecting a hen and locating the actual reproductive tract
- How a human egg is formed and develops into a fetus
- The effects of four basic hormones on embryo development

Materials Needed:

- Diagram of a hen's reproductive tract (from Reproduction and Fertilization of Poultry-Level III)
- Member Handout 5 - "Procedure for Dissecting a Hen's Reproductive Tract"
- A laying and a nonlaying chicken (at least one hen per four youth)
- Large knife and scissors (for each group)
- Sheet of plastic (for each group)
- Paper towels, sponges, dishpan, etc., for each group of four

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Leader Notes

The female chicken has special organs for reproduction. She produces sex cells in the form of **eggs** or **ova**. During a normal reproductive life of 12 to 14 months, a female chicken may lay 250 to 300 eggs that are formed by the **ovary** and its associated **oviduct**. A hen's egg is large because it contains all the food the developing embryo will need during incubation.

Egg Formation

The hen's reproductive tract is divided into two distinct sections, the **ovary** and **oviduct**. The chicken has two ovaries and oviducts, but only the left ones are functional and produce eggs.

Refer to diagram of ovary and oviduct from Level III lesson "Reproduction and Fertilization of Poultry."

The ovary is a mass of tissue which consists of yolks in varying stages of development. The left ovary is located in the body cavity near the backbone. An ovary contains several thousand yolks which are present at the

time the female chick is hatched. When the young female chick (pullet) nears sexual maturity, an increase in secretion of the follicle stimulating hormone (FSH) causes immature yolks to start to swell from absorption of yolk material. Each yolk is surrounded by a vascular membrane. A line (**stigma** or **suture**) devoid of blood vessels is evident on the membrane. During release (**ovulation**) of the yolk from the ovary, the sac normally breaks along this line. This prevents bloodspot deposits in the egg. The empty sac is absorbed by the bird's body.

The **oviduct** completes the formation of the egg. It consists of five sections. The **funnel** or **infundibulum** engulfs the yolk released by the ovary. Fertilization takes place in this section if viable sperm are present. The **magnum** secretes the thick white of the egg, which takes about three hours. Also, the shape of the egg is formed in this section. The next section, the **isthmus**, surrounds the white and yolk with two shell membranes. This process takes about 1¼ hours. Next, the egg moves into the **uterus** where it remains for about 20 hours. Here the thin white and the outer hard shell are added. Since the shell is mostly calcium, the demand for calcium is very high during this time. Shell pigments are also added in the uterus. After the egg is completed, it moves to the **vagina** where it remains until it is laid. It takes from 25 to 27 hours after ovulation to complete formation of an egg. When the egg is laid, it passes into the **cloaca**, which is the common passageway for the reproductive and digestive tracts.

Now it is time to locate the reproductive parts in an actual mature hen. You should have done this before to help members through the process. However, it is important to allow members to explore and provide minimal assistance when they are dissecting and identifying parts.

Give each member the handout "Procedure for Dissecting a Hen's Reproductive Tract." Depending on number of hens available, let each member dissect a bird. There should be at least one bird for every four members.

Hormonal Influence

Various stages in the formation of the egg are under the control of **hormones** that are secreted by the **endocrine glands**. The action of the hormones are very specific. Many of the malfunctions of the reproductive tract that occur in the hen are the results of malfunctions of one or more of the endocrine glands. The major hormones involved in egg formation are:

1. **Follicle Stimulating Hormone (FSH)**. This hormone, which is released by the pituitary gland, is responsible for development of the egg yolks. Secretion of this hormone is under the influence of day length; increasing day lengths stimulate secretion and decreasing day lengths depress secretion.
2. **Luteinizing Hormone (LH)**. This hormone, which is also secreted by the pituitary gland, causes release or ovulation of the egg yolk from the ovary.
3. **Estrogen**. This hormone, which is secreted by the ovary, stimulates the enlargement of the oviduct and spreading of the pubic bones in preparation for egg production. The ovary also secretes the male sex hormone **testosterone** which causes the pullet's comb and wattles to enlarge and redden.
4. **Oxytocin**. This hormone, which is secreted by the pituitary, stimulates laying of the completed egg.

Egg Defects

Occasionally, malfunctions occur in the reproductive tract of the hen, resulting in defective eggs. Examples are **double-yolked** eggs, the result of two yolks being ovulated at the same time; **yolkless** eggs, caused by something stimulating the magnum to secrete thick white followed by the addition of the shell; an **egg within an egg**, which we think is caused by a normal egg traveling back up the oviduct and then being covered with egg white and another shell as it proceeds down the tract a second time; eggs with **odd shapes** or **wrinkled shells**, the result of a malfunction of the uterus from certain diseases; and a **worm** in the egg, which is very rare and occurs when a worm leaves the intestine and gets in the oviduct.

DIALOGUE FOR CRITICAL THINKING

1. What were the most difficult, and easiest, parts of the dissection procedure?
2. How did it feel to discover the actual tract?
3. What do you think is the most unusual part of the hen's reproductive tract? Why?
4. How does a hen's egg differ from a cow's or human's egg?
5. Compare a chick's development to that of a human embryo or fetus.
6. How are newly hatched chicks and newborn human babies similar? Different?
7. How would you relate malfunctions of a hen's reproductive system to malfunctions of a human's system?
8. How does the effect of hormones in the hen compare to the hormones and their effects in a female human?

GOING FURTHER

1. Using a hen or diagram, show and explain the different parts of the hen's reproductive tract to your club or class.
2. Obtain eggs from as many different species of birds that you can and share their differences with your club or class.

REPRODUCTIVE SYSTEM OF THE HEN
POULTRY SCIENCE, LEVEL IV
Member Handout 5

Procedure for Dissecting a Hen's Reproductive Tract

1. Obtain a hen in active egg production from a local poultry producer, and, if possible, a hen that is out of production.

2. Humanely dispose of the bird(s) by dislocating the vertebral column just behind the head. Grasp the head in one hand and the legs in the other. Slowly pull on the head until you can feel the vertebrae separate.

3. After the bird has ceased struggling, moisten its feathers in water.

4. Lay the bird on its back on a piece of plastic on a table.

5. Beginning at the vent, make an incision with scissors or knife through the skin running the length of the body over the breast and along the neck to the head region.

6. Make a U-shaped incision through the abdominal wall (ribs).

7. Separate the breast from the carcass at the shoulder joints. The internal organs should now be exposed.

8. Remove the digestive system and heart by severing the digestive system where it enters the body cavity and at the large intestine. Now the ovary and oviduct of the hen should be exposed.

9. Grasp the ovary and cut it away from its attachment to the backbone.

10. Remove the oviduct by severing it where it is attached to the cloaca.

11. Spread the parts on a flat surface.

12. Using a diagram or picture of the hen's reproductive tract, identify and discuss each section. (Refer to Reproduction and Fertilization of Poultry, Level III.)

13. Compare the lengths of the tracts from the laying and nonlaying hens. Why is there such a difference in size?

Mounting a Chicken Skeleton for Display

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT

- Nomenclature and function of a chicken's bones
- To prepare and mount a chicken skeleton for display

ABOUT THEMSELVES:

- Nomenclature and functions of some human bones
- Their feelings about following detailed step-by-step procedures

Materials Needed:

- A mature chicken (young birds do not have completely calcified bones)
- Sharp knife
- One tube quick-drying cement or glue
- Clear plastic spray
- Small paint brush
- Two feet # 30 aluminum wire
- Three feet #22 wire
- One 16-inch piece of stainless steel wire $\frac{1}{16}$" diameter
- One 21-inch piece of $\frac{3}{16}$" diameter stainless steel rod
- Old toothbrush
- Small bottle of chlorine bleach
- A 7x12x1-inch piece of hardwood for base
- Member Handout 6 - "The Skeleton of a Fowl"
- Small drill

ACTIVITY TIME NEEDED: 3–5 DAYS

ACTIVITY

Now that you know the major parts of a chicken's skeleton, preparation of a chicken's skeleton for mounting will allow you to visualize how your skeleton is put together, how it functions, and special adaptations of a bird's skeleton for flight.

Procedures for Mounting a Chicken

1. Obtain a mature bird that is several years old.
2. Dispose of the bird by severing its jugular vein at the throat or under proper supervision, use an anesthetic (either, chloroform, or intravenous urethane at the rate of 2 to 3 grams per kilogram of body weight). Be careful that the bones are not broken.
3. After all life has left the bird, remove the skin with the feathers, all viscera (internal organs), comb, and wattles. Cut the meat off the

Leader Notes

This activity will need to be divided up into several parts. Each member should have a bird, but some procedures may need to be done in pairs or small groups.

breast, thigh, legs, etc. Do not cut or damage the ribs or other bones. Dispose of all parts except the now relatively denuded carcass. **Caution** - Care should be taken to prevent cutting poorly calcified portions of the skeleton. Special care must be taken when cutting in the regions of the head, face, and toes.

4. Remove the scales from the metatarsus (shanks and toes).
5. Remove the internal organs and be careful not to break the pubic bones. It is not essential to remove all soft tissue from the skeleton.
6. Fold the legs, wings, and neck along the body and tie with a string to make a small compact mass of intact skeleton.
7. Put the carcass in a container and cover it with water. Boil the water for at least 2 hours. Reduce the heat and allow the carcass to simmer for another four hours. Using a pressure cooker will shorten cooking time. Cool the cooked carcass and strip off any remaining flesh. Then scrub the bones clean with a toothbrush. Stringing the bones of the neck and tail with wire will keep them in order to make the assembly job easier.
8. After the skeleton has dried at room temperature or baked at 200°F for an hour, the bones can be bleached by placing them in a solution of one cup of chlorine bleach in 4 quarts of water for 24 hours.
9. The piece of hardwood and stiff metal rod will be needed to support the skeleton after drying.
10. Split one end of the rod with a fine tooth metal saw and bend the two resultant prongs into a shape of a U or saddle. Now bend the rod so that the saddle will fit around the thoracic vertebrae between ribs number 2 and 3. Carefully bend the rod (do not bend while it is attached to the skeleton) until it will pass in the mid-saggital plane (the plane dividing the bird into right and left halves) just below the thoracic vertebrae, diagonally down to the caudal (rear) tip of the metasternum, then continue the rod ventrally at a slope of approximately 135 degrees. The lower end of the rod will eventually be fixed in the center of the wood base. Until this is done, the rod can be held in a vise.
11. Push a piece of heavy wire as far as possible inside the neural canal of the fused vertebrae of the back, then bend it in a S-shape curve to resemble the natural curve of the neck of the bird. Put the first thoracic vertebra in place, and then put the cervical (neck) vertebrae on the wire and push them into their normal positions with the surfaces overlapping. After the cervical vertebrae are in place, cut the wire so that it will extend 1 inch beyond the vertebrae. Bend the end of the wire so that it will support the skull in a natural position. All cervical vertebrae can be glued. Use a quick-drying airplane model glue.
12. The femurs of the legs must be inserted into the sockets of the pelvic girdle (ilium-ischium). Hold them in place with a pin of medium-size wire extending from one femur through the socket cavities to the other femur. Make holes for this pin with a small drill.

13. The bones of the legs can be wired together or glued with quick-drying cement. In some cases the bones may be held in a normal position by the ligaments.
14. After attaching the legs to the pelvic girdle as previously described, you can determine the length of the support rod. Cut the rod to the necessary length to support the skeleton in an upright position and anchor it to the base board.
15. The phalanges (wing tips) can now be straightened and put into normal position. Use small drops of quick-drying cement to hold the digits against the wood base. The bones of the wings can be wired or cemented into position. Usually the humerus and the radius and ulna are parallel to the scapula and metacarpus. The digits extend ventrally at a 90-degree angle from the forearm. For additional support, use a piece of medium-size wire to thread the wing bones and the vertebrae together.
16. The lower mandible (part of beak) can be cemented or wired at the point of contact with the quadrate (skull). The hypoid apparatus (bone which supports the tongue) can be put in place and cemented or supported by a cemented thread. If the strain is not great, the thread works well and is hardly noticeable. The ocular rings may be suspended in two places by cemented thread.
17. When the skeleton is in its final position, you can retouch many joints with quick-drying cement. Then spray it with clear plastic for preservation or brush it with a thin coat of varnish.

DIALOGUE FOR CRITICAL THINKING

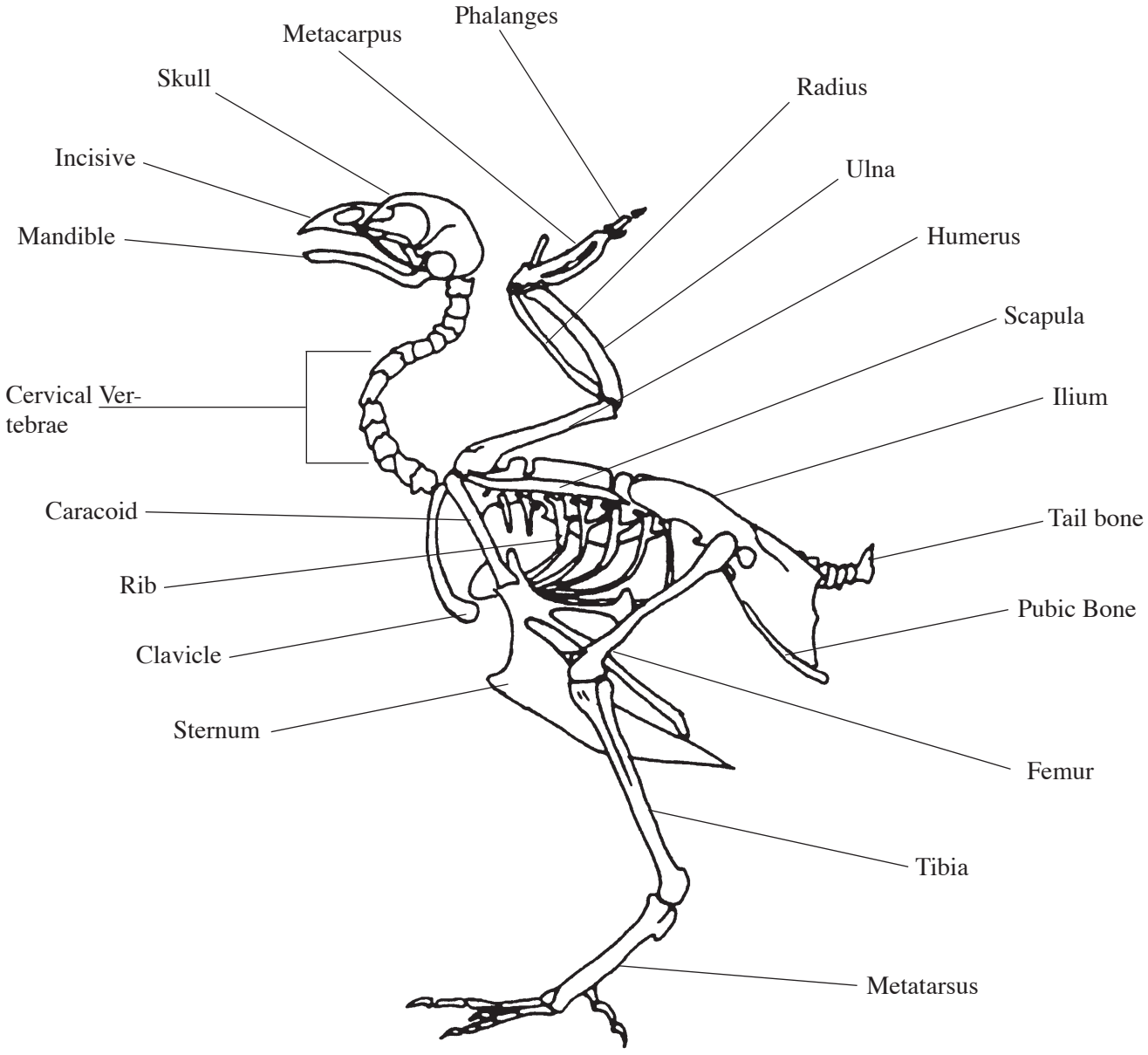
1. What were some of the more difficult tasks that you performed?
2. As you prepared and assembled the bones, what were some of the surprises that you encountered?
3. What other tasks in life require this kind of patience and detail?
4. What are some of the similarities and differences of a chicken's bones and skeletal structure as compared to those of humans?
5. How can this detailed step-by-step process help you in everyday life?
6. What other procedures can be compared to this exercise?

GOING FURTHER

1. Exhibit your completed project at a local or county fair.
2. Prepare and present a demonstration or illustrated talk for your next 4-H club meeting.

MOUNTING A CHICKEN SKELETON FOR DISPLAY
POULTRY SCIENCE, LEVEL IV
Member Handout 6

The Skeleton of a Chicken



Promoting and Marketing Poultry Products

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- Promotion and marketing methods
- What poultry products are marketed to consumers
- Who promotes poultry products
- How to develop a commercial for poultry products

ABOUT THEMSELVES

- Their ability to be creative and make decisions when promoting themselves for a job
- Their feelings about honesty
- Their interest in promotion and marketing as a career option

Materials Needed:

- Magazine or newspaper advertisements relating to poultry products
- Large sheet of paper or poster board and marking pens
- Several poultry product packages

ACTIVITY TIME NEEDED: 60 MINUTES

ACTIVITY

Leader Notes

What are some reasons why you buy a certain product? How do you learn about new products? What are some products that are advertised to the public? How are products promoted to the public?

Divide members into groups of two to three. Ask them these questions and write their answers on a large sheet of paper.

Type of Advertising

Promotion and advertising of products is found all around us in a variety of media. From a newspaper advertisement to a television commercial, advertisements can be seen every second of every day. The promotion of a product may be directed in one or several directions: "It's good for you," "It will make you popular," "It will make you beautiful," "It will save you money," etc.

Look through magazines and newspapers. Have members share an advertisement with the group and point out the main selling point of that advertisement.

Some other places that you might find products promoted would be a trade show, store display, and fair exhibit booth, to name a few.

Besides advertisements, products are also promoted through the packaging of the product itself. Products are usually sold or displayed in attractive, eye-catching packaging. What kind of packaging do you find poultry products in? What information would you want to see on the package?

Have members look at packages and list types of information provided.

List sponsors of the various product promotions.

Who Promotes Products?
A product is not usually marketed by one single person or business. Product advertisement and promotion is handled by a variety of individuals and organizations. There may be poultry producers, poultry producer organizations, poultry product manufacturers, retail stores, etc. If you look through a magazine or newspaper, identify who is behind the product promotion.

Related Activities

1. Make a poster or scrapbook of poultry advertisements and promotion pieces.
2. Develop a commercial or advertisement for poultry products. Divide your members into groups of two or three. Have each group select a poultry product to advertise. Have members write their own script and present it to the group.
3. Take a tour of a grocery store and look specifically at the merchandising of poultry products. Take note of where the items are located, how they are packaged, what information appears on the label, special promotion displays, etc. Make a list of all poultry products sold.

DIALOGUE FOR CRITICAL THINKING

1. What are some important aspects of marketing and promoting a product?
2. What type of advertising do you think is the most beneficial and effective?
3. How did you feel about developing your own commercial? Did you do video, radio, or other? Why?
4. What major problems did you have when making a commercial?
5. What role does honesty have in advertising?
6. Compare making a commercial with interviewing and applying for a job.

GOING FURTHER

1. Visit with an advertising agency to see what guidelines they follow in designing advertisements.
2. Develop a promotional exhibit to be displayed with the poultry exhibits at the county fair.

Poultry Welfare/Rights Issue

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- Definitions of five poultry welfare terms
- The advantages and disadvantages of modern poultry production practices
- How to respond to animal activists' inquiries

ABOUT THEMSELVES:

- Their feelings about their basic human rights
- Their feelings when the rights of their peers are violated

MATERIALS NEEDED:

- Activity Sheet 1 - "Media Quiz"
- Member Handout 7 - "Egg Producers' Husbandry Practices"

ACTIVITY TIME NEEDED: 45 MINUTES

ACTIVITY

Leader Notes

Prior to World War II, most farms had a small flock that was kept in a house with roosts, nests, litter to scratch in, and access to outdoor areas in moderate weather. People concerned about the welfare of poultry believe this type of environment is good because it is similar to the natural environment of the wild chicken. But, a chicken running loose in the wild or outdoor run faces the dangers of predators, severe weather, and disease.

Most recently, the hen's life-style and environment have been altered in major ways. Artificial incubation and brooding have replaced the hen, and "broody" behavior is rarely seen because broody hens don't lay eggs.

Flocks have become fewer but larger in response to increasing housing and equipment costs. This trend has resulted in total confinement, reduced living space per bird, and automatic feeding, watering, egg collection, and manure removal. These features have led to the term "factory farming," which is frequently used by animal activists as a criticism of modern poultry production practices.

The final step in this trend was the adoption of cages for hens because the number of birds in a house could be increased by stacking rows of cages above each other. As the living space per hen was reduced, problems such as **cage fatigue, cannibalism, excessive feather loss, flightiness,** and **reduced productivity** appeared. To reduce these problems, the poul-

try industry has adopted such practices as beak trimming, declawing, and low light intensities. These problems and the management practices that have been adopted to reduce them have caused people to raise questions about the welfare of birds kept under these conditions.

Animal welfare refers to how we treat the animals we use. Causes of suffering in poultry can be divided into three main forms: **abuse**, which expresses itself as fear, injury, pain, and distress; **neglect**, through ignorance or overwork such as malnutrition, disease, or distress; and **deprivation**, resulting in changes in normal behavior of the bird.

Many people believe that we can use animals ethically, but that we must treat them humanely and responsibly.

Many other people believe that humans should not use animals for food, clothing, sport, or research. A few people take this view to an extreme, and are violently opposed to using animals for human purposes.

Here are some tips when dealing with animal welfare groups or the media.

First, know who the organizations or individuals are and what views they represent.

Second, listen to and understand what they are saying. This will require you to study information about the organization.

Third, study the issues raised by animal activists. What are the real issues they are concerned about? Why are they concerned? What laws does your state have that pertain to animal well-being?

Fourth, respond to these issues in a factual and calm manner. What are the advantages of the modern poultry industry to society? Why are such husbandry practices as beak trimming necessary? How can you tell when chickens are receiving proper care?

Give each member the "Media Quiz" either as a handout and a group discussion or a general group discussion.

The modern poultry industry is concerned about the well-being of its birds and has developed husbandry guidelines for the industry such as The United Egg Producers Husbandry Practices for Laying Chickens. Good husbandry practices result in good productivity.

Give each member the "Egg Producers' Husbandry Practices" handout to discuss as a group.

DIALOGUE FOR CRITICAL THINKING

1. How did you feel about discussing the poultry welfare issue?
2. How did you feel if you were asked to represent a view that you did not agree with?
3. What specific issue did you discuss most? Why?
4. What personal experiences have you had with the animal welfare issue?
5. What position do you most closely agree with?

6. How do animal rights compare to human rights?
7. What rights do you have as a United States citizen that other people may not have?
8. How can you apply these concepts to basic human rights and your personal beliefs?

GOING FURTHER

1. Make a presentation to your club about a major animal rights organization.
2. Make a presentation on husbandry practices that are used by the poultry industry to improve the well-being of birds.
3. Tour a modern egg production or turkey production facility to view husbandry practices.

THE POULTRY WELFARE/RIGHTS ISSUE

POULTRY SCIENCE, LEVEL IV

Activity Sheet 1

Media Quiz

1. The media has an important role in developing public policy. ___T ___F
2. Public understanding of animal welfare is increased through media coverage. ___T ___F
3. Good media relations can be achieved through consistent contacts with the news media. ___T ___F
4. It is always best to wait a few minutes before doing an interview with a reporter. ___T ___F
5. Let the reporter select the place for the interview. ___T ___F
6. In order to feel comfortable, ask the reporter for a list of questions in advance. ___T ___F
7. "Off the record" should rarely be used. ___T ___F
8. Always make sure to find out when the article will run and how long it will be. ___T ___F
9. Radio interviews should not be conducted over the telephone. ___T ___F
10. Always call and make an appointment before dropping by to see an editor. ___T ___F
11. In order to communicate effectively with a television audience, the person being interviewed should look at the camera. ___T ___F
12. A good public speaking voice is necessary for a broadcast interview. ___T ___F
13. Always prepare a short standard message for broadcast interviews. ___T ___F
14. Being armed with plenty of facts is important in the preparation for an interview. ___T ___F
15. Hypothetical questions should be avoided. ___T ___F

THE POULTRY WELFARE/RIGHTS ISSUE
POULTRY SCIENCE, LEVEL IV
Member Handout 7

United Egg Producers
Husbandry Practices for Laying Chickens

_____
(firm name)

Herein subscribes to the following practices outlined in the United Egg Producers Recommended Guidelines of Husbandry Practices for Laying Chickens.

- **To provide** the housing and equipment necessary to protect the health and welfare of my flocks.
- **To provide** the necessary sanitation, vaccination, and medication programs to protect the health of my flock from disease, infection, and poultry illness. No drugs are used to stimulate growth.
- **To maintain** all feed, water, light, ventilation, and standby equipment in good operational condition.
- **To provide** cages which have adequate space and take into consideration the welfare of my flock.
- **To give** due consideration to the welfare of the flock when making husbandry decisions.
- **To use** humane methods when I kill a bird.
- **To schedule** a daily inspection of all birds on my farm.
- **To make** all personnel knowledgeable of factors that cause discomfort to pullets and hens.
- **To follow**, to the best of my ability, the recommendations set forth in the Guidelines of Husbandry Practices for Laying Chickens.

_____
(authorized firm signature)

Careers in the Poultry Industry

Poultry Science, Level IV

What Members Will Learn . . .

ABOUT THE PROJECT:

- Ten possible poultry careers
- Salary ranges for poultry careers
- Educational requirements for poultry careers

ABOUT THEMSELVES:

- Their likes and dislikes about the poultry industry
- Their ability to discuss major factors in making career choices
- Their feelings and interest in education as it reflects on career choices

Materials Needed:

- Notebook and pencil

ACTIVITY

A few years ago, the poultry business was considered a weak moneymaking enterprise. However, since the increase in demand for poultry meat, the poultry industry has become very successful.

The following aspects of the poultry industry should be considered before studying specific careers:

1. The scope of the industry in your area and state
2. The importance of poultry in the United States as opposed to other countries
3. The production phases or segments of the industry:
   a) Hatcheries
   b) Fryers
   c) Broilers
   d) Pullet growing
   e) Layer operations
   f) Egg industry
   g) Roasters
   h) Turkeys
   i) Ducks and Geese

Consider some of the following methods to help you analyze possible poultry careers:

1. Invite a poultry specialist, career counselor, or other resource person to visit your group.
2. View movies, slide sets, or videos on poultry careers.
3. Visit segments of the industry in your area.

Leader Notes

Learning about careers in the poultry industry could be a single visit or a whole series of activities depending on your members' interests.

Leader Notes

Each of these ideas could be an entire meeting, or small groups of members could visit industry locations or interview people in a career and report back to the group. Have each member keep a log or diary of each career studied.

4. Invite poultry company representatives to your meetings.
5. Invite a poultry feed company or pharmaceutical company representative to your meeting.
6. Do a computer search for jobs or careers in your local library.
7. Study consumer and food safety-related jobs.
8. Ask someone from a government agency to discuss state, national, and international opportunities.
9. Study opportunities for research and teaching.
10. Have a discussion with other members about their career plans and what their goals are for the next 5 to 10 years.

DIALOGUE FOR CRITICAL THINKING

1. List and discuss all the poultry careers you know.
2. What was the most interesting aspect of all the poultry careers you studied?
3. What were some of the pros and cons of various poultry careers?
4. What decisions must you make to prepare for most poultry careers?
5. How could this career study process help you in related fields or other career options?
6. How do you feel about the educational requirements for most poultry careers?

GOING FURTHER

1. Write to the USDA and other poultry agencies, such as the Poultry Science Association, for more information.
2. Give presentations to other groups about the opportunities in the poultry industry.

Adapted from a Kansas State University Cooperative Extension Service publication written by Cynthia R Siemens and reviewed by James P. Adams and Albert W. Adams, All from KSU.

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4-H

WASHINGTON STATE UNIVERSITY
EXTENSION

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