POULTRY

A GUIDE TO ANATOMY AND SELECTED SPECIES
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As you review the 4-H Activity Guide the following appendix may serve as a reference for your convenience.

To meaningfully study and recognize the distinguishable characteristics of the different species, breeds, and varieties of poultry, it will be necessary to know the accepted nomenclature of external anatomical features.

The male and female chickens (illustrations #1 & #2) have some identical features. It is desirable to recognize and distinguish the features of the beak, comb, ears, earlobes, eyes, eye ring (eyelid), hackles, thigh, lower leg, hock joint (ankle), shank (foot), toes, and claw. The lower part of the beak is hinged at the jaw and is movable; the upper part of the beak is fused to the skull (illustration #3). The comb and wattles are red, soft, and warm. The ears are merely openings into the auditory canal protected by small feathers; the earlobes consist of tightly fitting specialized skin devoid of feathers. The color of the earlobes (red or white) depends upon the breed. The eyeball is covered by the eye ring which, when open, appears as a circle of skin defining the ocular opening. The hackles are the feathers of the neck. The thighs are not easily distinguished in the standing chicken as they are located along each side of the body and well covered with feathers. The lower leg is feathered and articulates at the hock joint with the scaly shank. Since the chicken stands and walks on its toes, the shank is the foot and the hock joint is the ankle. Most chickens have three toes projecting forward and one claw projecting back.
There are different types of combs that are inherited characteristics of breeds and varieties. The single comb (illustration #3) is most familiar, having its base of attachment to the skull. Its posterior edge is the blade, and the spaces defined by its points are serrations. The pea comb (illustration #4) has three rows of bumps. The rose comb (illustration #4) has many very small bumps and may not have a spike projecting back. The strawberry comb (illustration #4) has a pitted texture, is relatively small, and sets well forward on the head with its larger end forward. The v-shaped comb (illustration #4) is associated with chickens that have a crest of feathers on the head, is very small, and sets well forward on the head. These chickens may or may not also have muffs or a beard of feathers. The buttercup comb (illustration #4), starting at the base of the beak forms a cup-shaped circle of points defining a deep cavity. It has a smooth, fine texture. The cushion comb (illustration #4) is relatively small and smooth in texture, setting low and well forward on the head.

The observable differences in secondary sex characteristics between the male and female chicken (illustrations #1 & #2) are referred to as sexual dimorphism. The male has a larger body, comb, and wattles. In single-comb birds the male’s comb will be turgid and stand erect, whereas the female’s comb may flop over on one side. In multicolored varieties, the male will have more variety of coloring in his plumage than the female. The male has longer and more pointed hackle feathers than the female. The male and female both have main tail feathers. However, in the male only, the tail feathers are covered by sickle feathers. Also, only the male has saddle feathers. The male has a larger, more developed spur than does the female.
A young chicken from hatch to five weeks of age is called a chick. A male chicken less than one year of age is a cockerel; a female through her first laying year may be referred to as a pullet. A mature male chicken greater than one year of age is referred to as a cock or rooster; a mature female greater than one year old may be called a hen.

The turkey has nomenclature similar to the chicken but with a few notable differences (illustration #5). It has no comb on its head, but does have a fleshy growth from the base of its beak that is known as a snood, which is very long on males and hangs down over the beak. It has a wattle, but also bumpy, red, fleshy tissue covering the head and neck called caruncles. Male turkeys have a tuft of long, bristly, black, coarse fibers attached to the breast, known as the beard.

A young turkey is called poult. A male turkey of any age may be referred to as tom; female turkey, a hen.

Ducks have nomenclature similar to that of the chicken, with the following notable differences (illustration #6). There is no comb or other head covering. The duck’s bill is flatter than the chicken’s beak and has a protrusion on the upper tip known as a bean. The duck has webbed toes used for swimming. Male ducks have curled feathers at the base of the tail distinguishing them from females. Male ducks emit only a hiss, whereas the female will also emit a squawk when handled.

A young duck is called a duckling. An adult male is a drake; and an adult female, a duck.

Geese have a few additional distinguishing features (appendix illustration #6). Some breeds will have a horny knob at the base of the bill. Some geese also have dewlap, which is a loosely suspended growth of skin extending from the base of the lower bill along the upper throat.

A young goose is called a gosling. An adult male is a gander; and an adult female, a goose.

Pigeons, guineas, and various ornamental and game birds are frequently raised for pleasure. Also, a limited number of producers raise them for profit, on a full-time or part-time basis. Game birds are
raised for sale to game preserves or for shooting preserves. Also, there is a limited market for the sale of ornamental birds.

The domestic guinea fowl is descended from one of the wild species of Africa. Guineas might be more popular were it not for their harsh and seemingly never-ending cry, and their bad disposition. Guinea chicks are known as baby keets. Usually, sex can be distinguished by the cry and by the larger helmet and wattles and coarser head of the male.

The peafowl belongs to the same family as pheasants and chickens, differing in no important characteristic other than plumage. Peafowl have a very raucous voice, which may annoy neighbors.

Pheasants are similar to chickens structurally and may be produced in a similar manner. Pheasants are generally raised for the purpose of stocking farms reserved for hunting by sportsmen. Pheasants originated in the orient and were first brought to America by Benjamin Franklin’s son-in-law. Pheasants are classified as (1) game breeds, or (2) ornamental breeds.

Pigeons are a versatile bird with four distinct uses: (1) the sport of racing pigeons; (2) flyers and performers; (3) showing fancy pigeons; and (4) meat production. There are about 200 different breeds of pigeons, each distinct from the other in behavior, size, shape, stance, feather form, colors, markings, and ornamentation. Pigeons are the most rapid growing of all poultry.

Swans are an ornamental bird. Swan chicks are properly called cygnets. Swans respond to the same care as geese. Swans live to be very old; the males have been known to live for more than 60 years.

**EGGS**

Eggs are a biological structure intended by nature for reproduction of birds. They protect the developing chick embryo and provide food for the first few days of the chick’s life. The egg is also one of the most nutritious and versatile of human foods.

Eggs of domestic chickens may be white, many shades of brown, or yellow. One breed lays blue-green eggs. Sometimes very small, dark flecks are present on the eggshell, especially if it is brown. Egg color often assumes economic importance, as there are numerous local prejudices in favor of shell tints. Colored eggs occur because pigment is deposited in the shell as it is formed in the uterus.

The structure of an egg is shown (illustration #7) with the various parts labeled in their normal position.

The protective covering known as the shell is composed primarily of calcium carbonate, with 6,000 to 8,000 microscopic pores permitting transfer of volatile compounds. The air cell is located in the large end of the egg, and is formed when the cooling egg contracts and pulls the inner and outer shell membranes apart. The chordlike chalazae holds the yolk in position in the center of the egg. As shown, a membrane surrounds the yolk, known as the vitelline membrane. The germinal disc, a normal part of every egg, is located on the surface of the yolk. Embryo formation begins here only in fertilized eggs.
The albumen, or egg white, is secreted around the yolk. Four distinct layers of albumen can be recognized in an egg: the chalaziferous layer, attached to the yolk; the inner thin albumen; the thick albumen; and the outer thin albumen. Three-fourths of the albumen is made up of the thick and outer thin albumen. The twisting of the egg during formation appears responsible for the separation of the albumen into the four layers.

Two shell membranes are formed, an inner and an outer shell membrane. These are rather loose fitting membranes when first formed. Water is added to the egg to “plump out” the egg into its final shape. The outer shell membrane is about three times as thick as the inner membrane. The membranes normally adhere to each other except at the large end of the egg, where they are separated to form the air cell.

The eggshell is made up almost entirely of calcium carbonate deposited on the outer shell membrane. The process of forming the shell requires 19 to 20 hours. About two grams of calcium is deposited in each eggshell. Strong eggshells are essential for eggs to be handled as they progress from farm to market. Hens are usually fed a laying ration to obtain the majority of the eggshell calcium directly from the feed, but they also withdraw some calcium from their bones, especially at night when they are not eating.
DIGESTION

Any animal can be thought of as a biological “machine” that converts raw materials into a finished product: in the case of poultry feed into meat and eggs; in the case of humans, food into happy, healthy, productive world citizens. Feed will pass, in order, through the following parts of the birds digestive tract: mouth, esophagus, crop, lower esophagus, proventriculus (glandular stomach), gizzard (muscular stomach), small intestine, ceca, large intestine (rectum), and cloaca. Not all ingesta goes through the ceca, which are mainly for breakdown of dietary fiber (illustration #8).

Illustration #8. The digestive system of poultry.

A distinctive characteristic of birds is the absence of lips and teeth. Instead, the bird has a hard beak that can be used for grasping, tearing, and scooping food. The digestive system works very efficiently in handling various types of food materials. The tongue contains the hyoid bone hinge at the lower jaw, and is pointed at the anterior tip with several barbed points projecting posteriorly on each side. Since the bird cannot swallow, the tongue moves back and forth forcing food down the esophagus. There are a few saliva glands in the mouth that contribute some moisture to the feed at this point.

The esophagus (gullet) is part of the tube that conveys feed from the mouth to the stomach. The crop, located in the lower neck area, provides storage for food materials hastily consumed by the bird. Here food is moistened and softened with little if any digestion occurring. The food particles move from the crop to the posterior section of the esophagus and into the glandular stomach (proventriculus) where the first significant amounts of digestive juices are added. Then food par-
articles move rapidly into the muscular stomach (gizzard) where physical breakdown starts. Gizzards
are highly muscular organs used for grinding and mixing feed materials in preparation for digestion.

Feed leaving the gizzard passes into the duodenal loop of the upper small intestine. The liver pro-
duces bile that is temporarily stored in the gall bladder. From the gall bladder, bile mixes with the
food slurry as it passes into the next part of the small intestine. In the duodenal loop digestion starts
as the pancreas secretes digestive enzymes. In the remaining area of the small intestine the digestive
process is completed and absorption of nutrients takes place. The small intestine in a mature chicken
is over 4.5 feet in length and terminates at its juncture with the large intestine.

The large intestine is relatively short, only about 4 inches in length, terminating at the cloaca. The
ceca consists of two pouches that fill and empty from the same direction. Their main function is
associated with breakdown of fiber, although chickens and turkeys cannot utilize large amounts
commonly associated with some poultry diets. The major functions of the large intestine are storage
of undigested waste material and absorption of water from their content.

The cloaca is the common chamber into which the digestive, urinary, and reproductive tracts open.
Its opening at the posterior end of the bird is known as the vent. When the bird eliminates fecal
waste from its digestive tract, the cloaca actually folds back at the vent allowing the rectal opening
of the large intestine to push out, closing the reproductive opening. Thus, there is minimal chance of
fecal wastes contaminating the reproductive system.

An understanding of the structures and function of the digestive tract of the bird is important to
understand the need for highly specialized diets: low in fiber and containing all the necessary nutri-
ents in adequate amounts that are relatively easy to digest.

Closely associated with the digestive system in the process of excretion in the urinary system, or
excretory system, including the elimination of waste products of body metabolism. The kidneys are
paired; each consisting of three lobes dorsally located along the vertical column posterior to the
lungs. The ureters are long tubes that connect the kidneys with the cloaca for the purpose of trans-
porting the waste products out of the body. The bird has no urinary bladder and thus does not pro-
duce a watery urine, as do mammals; it excretes the urates or products of metabolism as solids that
are added to feces as a white cap.
Turkeys are raised primarily for meat. Consumers want birds that have a high proportion of white breast meat. The United States produces nearly 300 million turkeys each year.

Turkeys may vary in color from white to bronze with mottled shades of black. The mottled shades are not as common as white or bronze.

White turkeys are the most popular turkeys for the production of meat. Others breeds can be bronze (red) or black colored. This bird is strutting, fluffing its feathers.
About 1 million geese are raised in the United States each year. Geese are raised for meat, eggs, feathers and down. (Down is the soft feathery covering that grows under feathers.) Many geese are kept for ornamental purposes. Some geese are kept to control weeds and grass.

The White Chinese goose has a distinctive knob on its head. Chinese geese can be colored brown in addition to the white color.

The Embden was one of the first breeds of geese introduced to the United States. It originated in Germany.
The **Toulouse** goose originates from the Toulouse area of southern France. The plumage is dark gray on the back, gradually shading to light gray edged with white on the breast and to white on the abdomen.

**DUCKS**

*Ducks are raised for meat, eggs, down and feathers. (Down is the soft feathery covering that grows under feathers.) Ducks are also kept as hobby or ornamental ducks.*

**White Pekin** ducks are the most popular meat duck in the United States reaching a market weight at 7 pounds in 8 weeks. The breed originated in China and was brought to the United States in the 1870s.

Ducks are very versatile and live happily under a wide variety of climatic conditions. Virtually everything from feathers to feet, including the liver and tongue, can be turned into a profit; the only unusable thing about them is their quack.
Rouen ducks are excellent meat producers but poor egg production and colored plumage make them unsuitable for mass commercial production. White plumage is preferred for commercial feather processing.

Muscovy ducks originated in South America. Numerous varieties of Muscovies exist; the white variety is the most desirable for market purposes. Muscovies are an excellent meat bird but their low egg production makes them unsuitable for commercial duck farms. Although they are not ideally suited to commercial production, Muscovies have excellent possibilities for small general farms with special retail outlets.

Call ducks are well suited as meat producers but poor egg production and colored plumage make them unsuitable for commercial production.

The brightly colored plumage makes the Gray Call duck an attractive exhibit on farms and estates.
| **GUINEA FOWL** | Guinea Fowl get their name from Guinea, a part of the western coast of Africa. History reveals that Guinea fowl have been raised as table fare since before the time of the ancient Greeks and Romans. Guinea fowl are used as a substitute for game birds and are considered a delicacy in some restaurants.

Guineas might be more popular in the United States if they were not so loud with their harsh and seemingly never ending cry. They often have a bad disposition and are not very popular with commercial producers. |
| **PEAFOWL** | Peafowl are raised for large, beautiful feathers. The feathers may be five times the length of the body. |

| | Peafowl belongs to the same family as pheasants and chickens, differing in no important characteristic other than plumage. Peafowl are native to India, Burma, and Malaya. |
| | Peafowl are usually sold as pairs of ornamental birds. They are edible and are regarded as a delicacy for special occasions. Peafowl have a very raucous voice, which may annoy the neighbors. |
| | Peacocks are the male and peahens are the female of the species. |
PIGEONS

Pigeons are versatile with four distinct uses: (1) the sport of racing pigeons; (2) flyers and performers; (3) showing fancy pigeons; and (4) meat production.

There are about 200 different breeds of pigeons, each distinct from the other in behavior, size, shape, stance, feather form, colors, markings, and ornamentation.

Pigeons often mate in pairs and remain pairs for life.
CHICKENS

Chickens primarily are raised for meat and eggs. The type raised depends on the product wanted. A few other specialty types are raised, such as game chickens and fancy show chickens.

Newly hatched **chicks**. Chicks is a term used to describe young chickens.

**Plymouth Barred Rock** rooster. Roosters are the male of the species and hens are the female of the species. The Plymouth Rock is one of the foundation breeds of the modern broiler industry.

**Plymouth Rock** rooster has a single comb with red wattles. Generally, Plymouth Rocks are not extremely aggressive, and tame quite easily.
Rhode Island Reds are a good choice for the small flock owner. A dual-purpose medium heavy fowl; used more for egg production than meat production because of its dark-colored pin feathers and its good rate of lay. Relatively hardy, they are probably the best egg layers of the dual-purpose breeds. This breed lays brown eggs.

New Hampshire a dual-purpose chicken, selected more for meat production than egg production. Medium heavy in weight, it dresses a nice, plump carcass as either a broiler or a roaster. This breed lays brown eggs.

White Leghorn is the most popular commercial egg production breed. Leghorns take their name from the city of Leghorn, Italy, where they are considered to have originated. Leghorns and their descendants are the most numerous breed we have in America today. This breed lays white eggs.
Old English game rooster. This breed is tightly feathered, very active, and very noisy.

Buff Cochin hens do not have the elaborate combs and coloring of the roosters.

Cochins are literally big, fluffy balls of feathers. They are mainly kept as an ornamental fowl and are well suited to close confinement. Their ability as mothers is widely recognized and Cochins are frequently used as foster mothers for game birds and other species. Cochins are originally from China but underwent considerable development in the U.S. They lay brown eggs.
Bantams are the miniatures of the poultry world. The word bantam is the overall term for more than 350 kinds of true-breeding miniature chickens.

Black Breasted Red Old English Game Bantam roosters were once popular as fighting birds until the sport was outlawed. Today they are bred as ornamental birds.

Black Breasted Red Old English Game Bantam hens are not as colorful as roosters but make attractive exhibits.

Black Bantam roosters are raised primarily as ornamental birds. Bantams are produced in a very large range of color markings. Bantams will commonly have a name similar or like the standard chicken breeds followed by bantam.
Designed to supplement the four 4-H activity guides in the AgriLearning Kit, AK-17 Eggsploring Poultry: cracking the egg

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