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POULTRY BIOLOGY, CLASSIFICATION, AND TRADE DESCRIPTIONS

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COMMERCIAL PRODUCTION OF CHICKEN

This book is not the proper forum to provide details on the commercial production of chickens. However, a general introduction is provided here as a frame of reference for discussion in all chapters.

Most commercial production of broiler chickens involves intensive and highly mechanized operations that use small areas in which the birds run on litter floors in large open poultry sheds. This differs from other forms of animal farming that use cages. However, a small percentage of broilers is now produced in larger areas in which the birds can run more freely. These birds are produced for specific markets.

Receipt of Chicks

Fertile chicken eggs are hatched in rooms with control for temperature and relative humidity. A yolk sac containing residue nutrients and moisture will sustain chicks for 2 to 3 days. However, it is important that the birds be kept warm, with feed and water available within easy reach. Within 72 h after hatching, chicks in ventilated boxes should be transported to broiler farms in specially designed air-conditioned trucks.

Housing Structure

On arrival at the farm, the newly hatched chicks are housed in open buildings called *units*, *sheds*, or *houses*. They vary in size, with a typical unit measuring 15 m $\times$ 150 m, holding about 40,000 adult chickens; some units can contain up to 60,000 broilers. There are usually three to 10 sheds or units on one farm. A typical new chicken farm has eight sheds holding about 40,000 birds each, with a total of about 320,000 chicken.

Ventilation by Mechanical Means In some countries, traditional broiler sheds are ventilated, with the sides of the sheds open to fresh air. The amount of fresh air is regulated by opening one or more vents or by leaving curtains open or closed accordingly. Other manual ventilation methods include the use of fans or a water-misting system to implement evaporative cooling in very hot weather. Newer chicken houses use tunnel ventilation: Fans at one end draw cool and fresh air over the chickens and fans at the other end blow it out. Heat sensors regulate the fans to heat and cool the structures at a desired rate of time and speed.

In some countries, including Canada and the United States, modern technology is used to air-condition such units in addition to other computerized systems to optimize management of the birds. Such operations are possible when chickens are mass-produced by multinational corporations under all environmental conditions. Chickens always have easy access to feed and water. Depending on the facility, silos on the outside supply feed into feed lines and pans from end to end of the unit. Drinkers are available at regular

intervals and connected to the water lines running from end to end of the shed.

Grow-out Phase

Key points to remember in the grow-out phase:

1. Provide suitable bedding, such as sawdust, wood shavings, or other material, such as rice hulls.
2. Preheat the unit.
3. Provide proper water and feed lines.

When the day-old chicks arrive at a broiler farm, routine procedures are as follows:

1. The chicks are initially confined to 30 to 50% of the floor space in the unit, usually referred to as the *brooding area*.
2. *Brooders*, gas heaters or heat lamps, are used to provide supplementary heat in addition to the shed heating system.
3. Extra feeding pans and water dispensers are added to assure sustenance. Additional paper is added on top of the bedding to prevent dropped feed from soiling the bedding.

Depending on several factors, including the business environment, a farm or company specializing in rearing male or female chicks for chicken meat may include both sexes in one plant or separate sexes in different plants in the same or different locations. The baby checks must enjoy comfort and good health to maximize their survival rate. The temperatures for proper rearing of baby chicks can be adjusted as follows:

- For the first few days, the optimal ambient temperature is 31 to 32°C.
- Growth is accompanied by less heat to keep them warm. After the first 2 days, the ambient temperature is decreased by about 0.5°C each day, until it reaches 21 to 23°C at 21 days.

The data above are suggestions only. Each farmer or company decides on the best temperature according to flock size, types of sheds, spaces available, and appropriate technical applications. Three factors are important: temperature, humidity, and air quality. All can be managed with the appropriate traditional means (i.e., fans, water vapors, ventilation, etc.) and/or modern technology (i.e., thermostats, pumps, vacuum, etc.).

The brooders are usually removed 4 or more days after the installation. In most cases they should be removed 2 weeks after installation. The space allocated to the flock increases as the chickens grow. Eventually, they are permitted to run freely over the entire shed floor. The farmer or company makes regular checks for the following:

- Is water available at all times or at a specific time?
- Is each water dispenser in working order?
- Is each feed dispenser in working order?
- Is feed available at all times or at a specific time?
- Is the ventilation system working properly?
- Is lighting adjusted to the proper intensity appropriate for the eyes of the chickens?
- Is lighting sufficient for chickens to locate water and feed?
- Is the dark period sufficient for chickens to rest?
- Are ambient temperature, humidity, and air quality adjusted and managed regularly using manual or automatic techniques?
- Is the litter clean and dry?
- Is the health of the flock excellent?
- Are dead, sick, or injured birds handled appropriately?
- Are the performance and health records of the flock acceptable?

Under proper management, a broiler flock usually suffers 3 to 4% loss during the grow-out phase. These birds may die of a variety of causes or from selective culling.

Harvesting Meat Chickens

Harvesting chicken is done several times annually or other defined period, depending on many factors, such as market needs and size of units. This collecting process is also known as *multiple pickup*, *partial depopulation*, *thinning out*, and other regional terms. In addition to being a business decision, this practice provides more space for the remaining birds and lowers the housing temperature. Several factors are involved in the actual process of harvesting:

1. *Days of growth*. The flock may be harvested at 30 to 35 days or as late as 55 to 60 days of growth.
2. *Time of day*. Night harvesting is preferred, to make sure that the birds are settled. Also, temperature plays a part during the summer.
3. *Collecting procedure*. Standard-experience crews pick up the birds in a dimmed lighting environment. This helps to settle the flock and facilitates handling. After being picked up by hand, the chickens are placed in specially designed containers for transport to a processing facility. Truck, rail, or other means of transport follows standard regional requirements.

Cleaning a Unit for a New Flock

Cleaning a unit after a flock has been harvested is essential before accepting the next batch of newborn chicks. The goals are no different from those of other businesses. Health, safety, and many other aspects are important factors

in guaranteeing that products are wholesome, marketable, and optimally cost-effective. So the following considerations are of major concern:

1. One batch of chicks stays for about 60 days, at which point it is removed from the housing unit. The period available for cleaning before the next batch arrives ranges from 5 to 15 days.
2. The extent of cleaning varies with each farmer or company and depends on the size of the flock, the size of each unit, and the types of operations (e.g., manual vs. mechanized vs. high tech). Cleaning covers bedding, floors, feed and water dispensers and accessories, equipment (i.e., fans, vacuum, pumps, etc.), and extraneous matter (i.e., rodent droppings, glass pieces, etc.). The techniques used vary depending on labor, devices, and other factors.
3. Legal requirements must be complied with in all aspects of the cleaning process: sanitation principles, use of such chemicals as disinfectants and insecticides, space allocation, and many other considerations.

Diseases: Precautions, Pest Control, and Records

At some farms, workers are responsible for diseases in the flock. Sources of contamination include hands, footwear, and vehicles. To minimize such risks, precautions include:

1. Enforcing authorized entries to sheds.
2. Enforcing the use of overalls and boots.
3. Requiring disinfection of footwear in specially equipped locations near entrances to sheds.
4. Disinfecting all equipment, including vehicles and pumps, with water or solutions.
5. Visiting flocks from youngest to oldest.

Birds in the environment can infect farmed chickens with diseases through their presence or droppings. Routine cautionary steps include the following:

1. Removing dropped feeds promptly.
2. Keeping domesticated birds in a location far from the sheds.
3. If circumstances permit, avoiding sources of environmental water such as dams and rivers.
4. Assuring that the chickens' drinking water is sanitary.
5. Enclosing the sheds using netting or a roof, or using completely enclosed sheds with proper ventilation.

Standard pest controls must be in place to prevent diseases from rodents or insect parts. There should also be mandatory or voluntary record keeping for chicken health, growth, and behavior.

Growth and Nutrition

Many factors are involved in achieving optimal growth rate and size at harvest, such as breed, gender, nutrition, and feed. *Nutrition* is the sum of processes by which food is selected and becomes part of the body. Balanced nutrition provides the nutrients that best meet bodily requirements for growth, maintenance, and repair. This fact applies to all living creatures. The word *nutrient* refers to a broad category of organic and inorganic compounds. The essential nutrients are carbohydrates (the source of energy), protein, fat, vitamins, minerals, and water.

Supplying enough nutrients to meet the requirements for maximum poultry production can be difficult. It is not feasible economically to supply just the right amount of food to meet requirements because some of the nutrient needs must be oversupplied to compensate for the limiting nutrients in the feed: usually energy and essential amino acids such as lysine and methionine. The formulation of poultry diets considers the essential nutrients of water, energy, protein, fat, vitamins, and minerals in the proper amounts for successful operation. They are provided by animal and vegetable proteins, animal and vegetable fats, macro and micro minerals, vitamin premixes, and cereals. Each separate type of ingredient provides a specific quantity and quality of nutrients to the diet and must be formulated skillfully for maximum growth, egg production, and feed efficiency. Balancing these ingredients to produce an optimal diet for poultry requires knowledge of the needs and composition of the ingredients as well as their cost: The formulation must balance needs vs. ingredients vs. costs.

Feed efficiency refers to the amount of feed required to produce a pound of body weight or the amount of feed necessary to produce a dozen eggs. Feed accounts for 65 to 70% of the cost of production, so producers should pay close attention to the requirements of each species.

Feed

Chicken feeds can come from a variety of sources, including land and marine plants and animal products. Although most feed is made up of land plants such as grains, others may be produced from certain land animal and marine plant and animal products. For ease of reference, let us assume that major chicken feed manufacturers use such grains as wheat, sorghum, barley, oats, lupins, soybean meal, canola, and other oilseed meals and grain legumes.

The use of additives and drugs in commercial poultry is governed by laws and regulations which vary from country to country. Depending on its size and operations, a feed manufacturer offers many options for meat chicken diets formulated to optimal and strict nutritional standards: These formulations will reflect availability, price and quality of the ingredients required, and the location, season, and age of a particular broiler flock.

Other than nutritional considerations, feeds are also produced to meet other requirements, including but not limited to:

1. *Starter feed:* small crumbles for baby chicks
2. *Grower feed:* fully formed pellets for growing birds
3. *Finisher feed:* feed made available after 25 days
4. *Withdrawal feed:* feed provided just before harvest

In the last 50 years, much professional and consumer literature has been disseminated on the rearing, production, and management of poultry. Readers should consult such sources for more details. However, as an illustration, one specific topic, competitive exclusion as a natural part of poultry management, is discussed in Chapter 2.

BIRDS COMMON TO THE LIVE-BIRD MARKETING SYSTEM

For regulatory commercial purposes, the U.S. Department of Agriculture (USDA) recognizes particular birds (poultry) common to the live-bird marketing system (Figure 1). The types of common live birds in domestic and international commerce are listed in Table 1.

BIOLOGICAL AND LEGAL CLASSIFICATION OF POULTRY IN THE UNITED STATES

The U.S. Department of Agriculture (USDA) has classified major poultry and poultry products in commercial transactions (see Table 2).

Ready-to-Cook Poultry

The standards apply to individual carcasses of ready-to-cook poultry in determining the type of poultry and its class. The types of poultry are: chickens, turkeys, ducks, geese, guineas, and pigeons. The classes within each type are described below.

Chickens

1. *Rock Cornish game hen or Cornish game hen:* a young immature chicken (usually, 5 to 6 weeks of age), with a ready-to-cook weight of not more than 2 lb, which was prepared from a Cornish chicken or the progeny of a Cornish chicken crossed with another breed of chicken.
2. *Rock Cornish fryer, roaster, or hen:* the progeny of a cross between a purebred Cornish and a purebred Rock chicken, without regard to the weight of the carcass involved; however, the term *fryer*, *roaster*, or *hen* applies only if the carcasses are from birds with ages and characteristics that qualify them for such designation under the regulations.

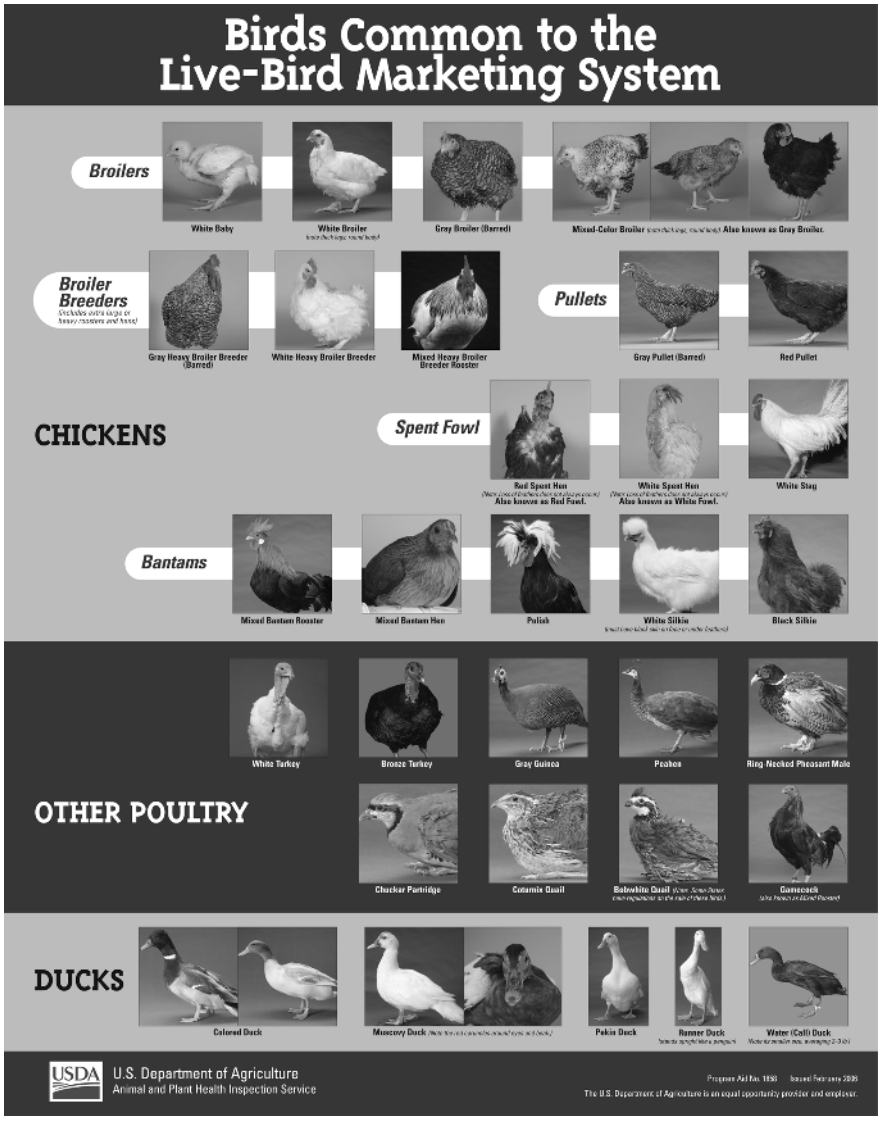

FIGURE 1 Birds common to the live-bird marketing system.

3. *Broiler or fryer:* a young chicken (usually, under 13 weeks of age), of either sex, that is tender-meated with soft, pliable, smooth-textured skin and flexible breastbone cartilage.
4. *Roaster or roasting chicken:* a young chicken (usually, 3 to 5 months of age) of either sex that is tender-meated with soft, pliable, smooth-textured skin and breastbone cartilage that may be somewhat less flexible than that of a broiler or fryer.

TABLE 1 Birds Common to the Live-Bird Marketing System

Chicken	Type
Broilers	White baby
	White broiler (note the thick legs and round body)
	Gray broiler (barred)
	Mixed-color broiler (note the thick legs and round body); also known as gray broiler
Broiler breeders (includes extralarge or heavy roosters and hens)	Gray heavy broiler breeder (barred)
	White heavy broiler breeder
	Mixed heavy broiler breeder rooster
Pullets	Gray pullet (barred)
	Red pullet
Spent fowl	Red spent hen (note that loss of feathers does not always occur); also known as red fowl
	White spent hen (note that loss of feathers does not always occur); also known as white fowl
Bantams	Mixed bantam rooster
	Mixed bantam hen
	Polish
	White silkie (must have black skin on face or under feathers)
	Black silkie
Other poultry	White turkey
	Bronze turkey
	Gray guinea
	Peahen
	Ring-necked pheasant, male
	Chuckar partridge
	Coturnix quail
	Bobwhite quail (some states have regulations on the safety of these birds)
	Gamecock also known *as* inlixed rooster
Ducks	Colored duck
	Muscovy duck (note the red caruncles around the eyes and beak)
	Pekin duck
	Runner duck (stands upright like a penguin)
	Water (call) duck (note its smaller size, averaging 2 to 3 lb)

5. *Capon:* a surgically unsexed male chicken (usually, under 8 months of age) that is tender-meated with soft, pliable, smooth-textured skin.
6. *Hen, fowl, or baking or stewing chicken:* a mature female chicken (usually, more than 10 months of age) with meat less tender than that of a roaster or roasting chicken and a nonflexible breastbone tip.

TABLE 2 Poultry and Poultry Products Common in Commerce

Ready-to-Cook Poultry	Ready-to-Cook Poultry Food Products
Chickens	Poultry roast
Turkeys	Boneless poultry breasts, drumsticks, thighs, and legs
Ducks	Skinless poultry carcasses and parts
Geese	Poultry tenderloins and boneless, skinless parts
Guineas	Size-reduced poultry products
Pigeons	

7. *Cock or rooster:* a mature male chicken with coarse skin, toughened and darkened meat, and hardened breastbone tip.

Turkeys

1. *Fryer–roaster turkey:* a young immature turkey (usually, under 16 weeks of age), of either sex, that is tender-meated with soft, pliable, smooth-textured skin, and flexible breastbone cartilage.
2. *Young turkey:* a turkey (usually, under 8 months of age) that is tender-meated with soft, pliable smooth-textured skin and breastbone cartilage that is somewhat less flexible than in a fryer–roaster turkey. Sex designation is optional.
3. *Yearling turkey:* a fully matured turkey (usually, under 15 months of age) that is reasonably tender-meated and with reasonably smooth-textured skin. Sex designation is optional.
4. *Mature turkey or old turkey* (*hen or tom*)*:* an old turkey of either sex (usually in excess of 15 months of age), with coarse skin and toughened flesh.

For labeling purposes, the designation of sex within the class name is optional, and the two classes of young turkeys may be grouped and designated as "young turkeys."

Ducks

1. *Broiler duckling or fryer duckling:* a young duck (usually, under 8 weeks of age), of either sex, that is tender-meated and has a soft bill and a soft windpipe.
2. *Roaster duckling:* a young duck (usually, under 16 weeks of age), of either sex, that is tender-meated and has a bill that is not completely hardened and a windpipe that is easily dented.
3. *Mature duck or old duck:* a duck (usually, over 6 months of age), of either sex, with toughened flesh, a hardened bill, and a hardened windpipe.

Geese

1. *Young goose:* may be of either sex, is tender-meated, and has a windpipe that is easily dented.

2. *Mature goose or old goose:* may be of either sex and has toughened flesh and a hardened windpipe.

Guineas

1. *Young guinea:* may be of either sex, is tender-meated, and has flexible breastbone cartilage.
2. *Mature guinea or old guinea:* may be of either sex and has toughened flesh and a hardened breastbone.

Pigeons

1. *Squab:* a young, immature pigeon of either sex that is extratender-meated.
2. *Pigeon:* a mature pigeon of either sex, with coarse skin and toughened flesh.

Poultry Parts

Individual carcasses of ready-to-cook poultry, parts of ready-to-cook poultry, and individual units of specified poultry food products are categorized as noted below. Clear to semiclear marinades or sauces may be added to ready-to-cook poultry products, provided that the ingredients do not alter or affect the appearance or definition of the product. Poultry parts are:

1. *Backs*
2. *Breasts* are separated from the back at the shoulder joint and by a cut running backward and downward from that point along the junction of the vertebral and sternal ribs. The ribs may be removed from the breasts, and the breasts may be cut along the breastbone to make two approximately equal halves; or the wishbone portion may be removed before cutting the remainder along the breastbone to make three parts. Pieces cut in this manner may be substituted for lighter or heavier pieces for exact weight-making purposes, and the package may contain two or more such parts without affecting the appropriateness of the labeling (e.g., "chicken breasts"). Neck skin will not be included with the breasts, except that "turkey breasts" may include neck skin up to the whisker.
3. *Breasts with ribs* are separated from the back at the junction of the vertebral ribs and back. Breasts with ribs may be cut along the breastbone to make two approximately equal halves; or the wishbone portion may be removed before cutting the remainder along the breastbone to make three parts. Pieces cut in this manner may be substituted for lighter or heavier pieces for exact weight-making purposes, and the package may contain two or more such parts without affecting the appropriateness of the labeling (e.g., "breasts with ribs"). Neck skin will not be included, except that "turkey breasts with ribs" may include neck skin up to the whisker.

4. *Drumsticks* are separated from the thigh by a cut through the knee joint (femorotibial and patellar joint) and from the hock joint (tarsal joint).
5. *Halves* are prepared by making a full-length back and breast split of an eviscerated poultry carcass so as to produce approximately equal right and left sides.
6. *Front poultry halves* include the full breast with corresponding back portion, and may or may not include wings, wing meat, or portions of wing.
7. *Rear poultry halves* include both legs and adjoining portion of the back attached.
8. *Legs* include the whole leg (i.e., the thigh and the drumstick), whether jointed or disjointed. Back skin is not included.
9. *Legs with pelvic bone* consist of a poultry leg with adhering meat and skin and pelvic bone.
10. *Quarters* consist of the entire eviscerated poultry carcass which has been cut into four equal parts, but excluding the neck.
11. *Breast quarters* consist of half a breast with the wing and a portion of the back attached.
12. *Breast quarters without wing* consist of a front quarter of a poultry carcass from which the wing has been removed.
13. *Leg quarters* consist of a poultry thigh and drumstick with a portion of the back attached.
14. *Tenderloins* consist of the inner pectoral muscle, which lies alongside the sternum (breast bone) of the poultry carcass.
15. *Thighs* are disjointed at the hip joint and may include the pelvic meat but not the pelvic bones. Back skin is not included.
16. *Thighs with back portion* consist of a poultry thigh with a back portion attached.
17. *Wings* include the entire wing (consisting of three segments) with all muscle and skin tissue intact, except that the wing tip (third segment) may be removed.
18. *Wing drummettes* consist of the humerus (first segment) of a poultry wing with adhering skin and meat attached.
19. *Wing portions* consist of a poultry wing with adhering skin and meat attached, except that the drummette (the first segment) has been removed The wing portion may consist of the second segment only, or the second and third segments.
20. *Wishbones* (pulley bones), with covering muscle and skin tissue, are severed from the breast approximately halfway between the end of the wishbone (hypocledium) and from the point of the breastbone (cranial process of the sternal crest) to a point where the wishbone joins the shoulder. Neck skin is not included with the wishbone.

Some factors that detract from quality:

1. Feathers
2. Exposed flesh (resulting from cuts, tears, and missing skin)
3. Discolorations (whether or not caused by dressing operations and bruises)
4. Disjointed and broken bones
5. Freezing defects

INTERNATIONAL TRADE IN POULTRY

Each country sells and buys poultry and poultry products according to its own legal, commercial, and cultural considerations, in addition to other factors. These products are in high demand worldwide, and transactions between countries have varied widely for many years. For nearly a decade, the USDA has been working with other countries to develop a system to facilitate international trade in poultry and poultry products. In 2000 a document entitled *United States Trade Description for Poultry* was distributed by the USDA to achieve this goal. This document is related primarily to chicken and has been updated several times since 2000. Next we discuss selected parts of the document as a frame of reference for this book.

The document provides useful information on the following: species, product, style, bone, skin class, quality level, certification requirements, state of refrigeration, production and feeding systems, slaughter system, postslaughter processing, and skeletal diagrams for chicken. The species of chicken is the domesticated bird, *Gallus domesticus*. Items to be traded include, for example, whole breast, wing, thigh, or liver. Style is a marketable form of a product to be traded. Styles may differ in composition, cut, and/or method of processing. A description for the presence of bone:

1. *Bone-in*. Bones are not removed from the product.
2. *Boneless*. All bones are removed from the product.
3. *Partially boneless*. Some but not all bones are removed from the product.

A description of poultry skin is as follows:

1. *Skin-on*. White or yellow skin is not removed from the product, and the purchaser will accept product with whitish or yellowish skin color.
2. *Skinless*. Skin is removed from the product.
3. *Skin-on, white*. Skin is not removed from the product, and the purchaser requires a whitish skin color.
4. *Skin-on, yellow*. Skin is not removed from the product, and the purchaser requires a yellowish skin color.

Chicken can be classified as follows:

1. *Broiler/fryer:* young chickens that are usually 6 to 10 weeks of age with a dressed weight of 1.13 kg (2.50 lb) or more.
2. *Roaster:* chickens that are usually 7 to 12 weeks of age with a dressed weight of 2.27 kg (5 lb) or more.
3. *Heavy fowl:* breeding hens and roosters, also called *baking hens*, that are usually more than 10 months of age with an approximate dressed weight of 1.81 kg (4 lb).
4. *Light fowl:* hens that have produced table eggs, also called *stewing hens*, which are usually more than 10 months of age with an approximate dressed weight of 1.13 kg (2.50 lb).
5. *Capon:* neutered male chickens that are usually less than 4 months of age.
6. *Rooster:* mature male chickens that are usually more than 10 months of age with a dressed weight of 2.72 kg (6 lb) or more.
7. *Cornish game hen:* young chickens that are usually less than 5 weeks of age with a dressed weight of 0.91 kg (2 lb) or less.

Chicken products are graded or evaluated to meet certain levels of quality designated by the processor or government authority. The purchaser may request third-party certification of the product's quality level (quality grade) and/or purchaser-specified options. This certification is usually issued by a governmental agency.

Meat may be presented chilled, chilled with ice or CO_2 packed in a container, hard chilled, frozen, frozen individually without ice glazing, or frozen individually with ice glazing. Product storage temperatures should be such throughout the supply chain as to ensure uniform internal product temperatures as follows:

1. *Chilled*. Internal product temperature is between -2.8 and 4.44°C (27 to 40°F) at all times following the postslaughter chilling process.
2. *Chilled, ice packed*. Product is packed in a container with ice (frozen water, not dry ice) to maintain the internal product temperature between -2.8 and 4.44°C (27 to 40°F) at all times following the postslaughter chilling process.
3. *Chilled, CO_2*. Product is packaged (must be placed in an internal package) and packed in a container with solid carbon dioxide (dry ice) to maintain the internal product temperature between -2.8 and 4.44°C (27 to 40°F) at all times following the postslaughter chilling process.
4. *Hard chilled*. Internal product temperature is between -18 and -2.8°C (0 to 27°F) at all times following the postslaughter chilling process.
5. *Frozen*. Internal product temperature is -18°C (0°F) or lower (also known as *deep-frozen*) at all times after freezing.
6. *Frozen individually without ice glazing*. Product is individually frozen so that the pieces do not stick together when packaged. Internal product

temperature is −18°C (0°F) or lower at all times after freezing. This option is available for parts only.

7. *Frozen individually with ice glazing*. Product is individually frozen and glazed with water to assist in protecting the individual pieces from freezer burn. Internal product temperature is −18°C (0°F) or lower at all times after freezing. This option is available for parts only.

The most common production and feeding systems for chicks and chickens include:

1. *Traditional production and diet*. Birds are raised in heated and air-cooled growing houses and fed a precisely formulated high-protein diet.
2. *Free-range production with traditional diet*. Birds are raised in heated and air-cooled growing houses with access to the outdoors and fed a traditional high-protein diet. Because birds have access to the outdoors, diet and biosecurity are not controlled closely. Specific production requirements may need to be defined by buyer and seller.
3. *Pastured/pasture-raised production with traditional diet*. Birds are raised outdoors using movable enclosures located on grass and fed a traditional high-protein diet. Specific production requirements may need to be defined by buyer and seller.
4. *Traditional production with organic and/or antibiotic-free systems*. Birds are raised in heated and air-cooled growing houses and fed an organic diet (without hormones or nonorganic additives) and/or raised without antibiotics (drugs that are intended to prevent or treat animal illnesses). Purchaser must specify such system requirements.
5. *Free-range production with organic and/or antibiotic-free systems*. Birds are raised in heated and air-cooled growing houses with access to the outdoors and fed an organic diet (without hormones or nonorganic additives) and/or raised without antibiotics (drugs that are intended to prevent or treat animal illnesses). Purchaser must specify such system requirements.
6. *Pastured production with organic and/or antibiotic-free systems*. Birds are raised outdoors using movable enclosures located on grass and fed an organic diet (without hormones or nonorganic additives) and/or raised without antibiotics (drugs that are intended to prevent or treat animal illnesses). Purchaser must specify such system requirements.

The most common slaughter systems include:

1. *Traditional*. Poultry products are slaughtered and processed in accordance with industry-standard processing practices.
2. *Kosher*. Poultry products are certified as meeting Jewish dietary laws and standards regarding slaughter and processing.

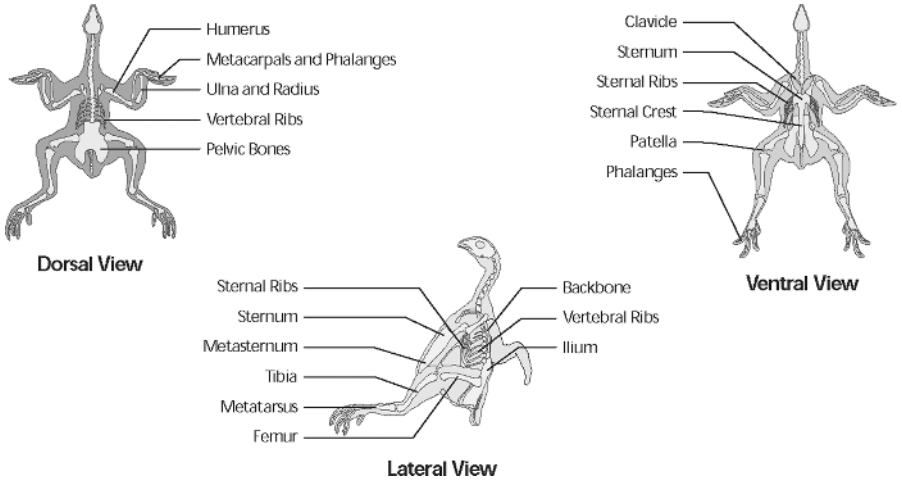

FIGURE 2 Skeletal diagrams of a whole chicken.

3. *Halal*. Poultry products are certified as meeting Islamic dietary laws and standards regarding slaughter and processing.

The most common postslaughter systems include:

1. *Immersion chilled*. The product is chilled by immersing it in cold water immediately after slaughter. U.S. producers typically use immersion chilling.
2. *Air chilled*. The product is chilled by exposing it to cold air immediately after slaughter.

Another tool used in international trade of chicken is the skeletal diagram, which is illustrated in Figure 2. Two of the three skeletal diagrams of a whole chicken shown in the figure are used to illustrate the composition of each whole-muscle product style. These three diagrams show the major bones of the chicken in dorsal or back view, ventral or breast view, and lateral or side view. The shaded areas of views for a particular product style represents the portion of the chicken included in that style.