Fact Sheets
CONTRIBUTIONS OF POULTRY TO THE DEVELOPMENT OF SCIENCE

BACTERIOLOGY (study of bacteria)

Anthrax, an infectious disease which causes high fever and even death in affected animals, was a huge problem in livestock in the 1800’s. Louis Pasteur (1822-1895) suggested that chickens did not get the disease because they have a high body temperature (41.5 °C). He injected a normal hen with anthrax bacteria and she lived. He injected another hen with anthrax bacteria and submerged her partially in water to lower her body temperature. The hen with the lowered body temperature died from anthrax.

Pasteur also worked with the disease known as fowl cholera. He found that if he cultured the bacterium that caused the disease (by growing it in a fluid especially prepared to nourish the cells) and gave a drop of culture to a chicken, the chicken would die. However, if he gave a drop of an OLD culture of the disease to a chicken, it exhibited a mild form of the disease and became immune (resistant) to the disease.

With this information, Pasteur was able to develop an attenuated virus vaccine against anthrax. Attenuated means that the strength of the disease-causing agent has been reduced by passing it either through animals other than the animal that normally contracts the disease or through culture. An example would be growing cattle plague bacteria in a chick embryo to make a vaccine that protected sheep from anthrax. This process also led to the work that developed vaccines against diseases such as tetanus and typhoid.

BEHAVIOR

T. Schjelderup-Ebbe (1894-1976) provided the first scientific observation of social behavior in animals in 1935. He described the ranking behavior or “peck order” that exists in a group of hens, documenting how one hen will always be dominant to all the other hens.

Konrad Lorenz (1903-1989) received the Nobel Prize for demonstrating imprinting with ducks. He showed that ducklings will identify as their parent the first object or person they see when they hatch.

BIOLOGICAL ASSAYS

It’s often necessary to establish the vitamin content of various foods. A vitamin is a substance present in natural foods which is essential for good health. An animal may synthesize a vitamin in its own body; however, by definition the animal cannot make all of the vitamins it requires for good health. Since young chicks are very susceptible to vitamin deficiencies, they have been used as a biological check for chemical methods that measure the vitamin content of foods.

EMBRYOLOGY (study of formation and development of embryos)

Hieronymous Fabricius (1533-1619) pioneered the study of embryological development using the chick embryo.

ENDOCRINOLOGY (study of hormones and hormone-producing glands)

Arnold A. Berthold (1803-1861) has been called the father of endocrinology. In 1849, he removed the testes from one cock. The cock’s comb became smaller and grew pale. When he transplanted testes into a capon (a castrated male), the bird again took on the appearance of a normal male. This was the typical sequence of events as long as the transplanted testes established a good blood supply. However, if a blood connection failed to form with the transplanted testes, the bird continued to lack the male appearance. This established the fact that the testes were producing some substance that traveled in the blood and gave the chicken its sex characteristics.

MENDELIAN GENETICS

Johann Gregor Mendel (1822-1884), the Catholic monk known as the father of genetics, conducted his pioneering research on peas. In 1866, he described what was to become known as Mendelian genetics. In 1898, William Bateson (1861-1926), working with chickens, was the first to demonstrate that Mendel’s laws applied to animals. Bateson found that both rose combs and pea combs were dominant to single combs.
GNOSTOBiotics (study of organisms raised in germ-free conditions)

Louis Pasteur addressed the French Academy of Sciences in 1885 on the topic of “germ-free hosts.” In order to study the influence of microflora (the microscopic and specialized organisms found in an animal’s digestive tract) on its host, the scientist must also be able to study hosts that are germ-free. It’s difficult to produce a germ-free mammal. Pasteur proposed that the chick was the most suitable model. If eggs are obtained from healthy hens, are incubated in a sterile incubator, and upon hatching are fed sterile food and water, they will be germ-free.

IMMUNOLOGY (study of mechanisms by which organisms resist and overcome infection and disease)

In 1956, Bruce Glick found that lymphocytes (a specific type of white blood cell) in the chicken’s Bursa of Fabricius (the small, sack-like structure found in the cloaca of young birds) were responsible for antibody production. These lymphocytes became known as B-lymphocytes (B for bursa-derived).

VIErology (study of viruses and viral diseases)

The first evidence that a virus could cause cancer came in 1911 when Francis Peyton Rous (1879-1970) discovered that the Rous sarcoma virus caused cancer in chickens. Rous won the Nobel Prize in 1966 for this work.

In 1969, A. Churchill developed a vaccine against the Marek’s disease virus. This was the first control of a significant neoplastic (cancerous growth) disease in any species.

VITAMIN DISCOVERY

In 1897, Christian Eijkman (1858-1930), a Dutch physician working in Java, discovered that hens fed a diet of polished rice became paralyzed. The chickens’ paralysis looked very much like the symptoms of human patients in the clinic where he worked. Humans were suffering from Beriberi (an impairment of the nerves and heart). When the birds were fed unpolished rice, they recovered. Eijkman’s discovery paved the way for the whole concept of vitamins. The pioneering work of Dr. Eijkman culminated in the discovery and isolation of vitamin B1, or thiamine. This important compound was contained in the bran or outer layers of rice; the bran had been removed when the rice was polished.

In 1930, Henrik Dam (1895-1976) found that chicks fed diets very low in fat developed an illness that caused them to hemorrhage. The blood of these chicks did not clot as fast as the blood from chicks fed a normal diet. In 1935, Dam discovered that the substance needed for good blood clotting was a factor that was found in green leaves and certain vegetables. He called it the “Koagulations” vitamin; in his native Danish, “coagulation” is spelled with a “k.” Therefore, the factor was named vitamin K.

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RATITES

A ratite is a family of large flightless birds with a flat, keelless breastbone. The keel bone of birds of flight is important for supporting pectoral flight (breast) muscles. Although ratites are flightless, they do have small wings which they use for cooling, for balance during running, and during courtship displays. Ratites are polyphyletic, which means they have descended from more than one evolutionary line. Some ratites can be kept as companion animals and pets. Recently in the United States they have been raised for their meat, feathers, and hide as well as other products such as oil. Ratites include such birds as rheas, kiwis, cassowaries, emus, and ostriches.

RHEAS

The rhea is from the order Rheiformes and the family Rheidae. There are two rhea species: the greater rhea (Rhea americana) and the lesser or Darwin’s rhea (Pierocnemia pennata). Both are native to South America. The Rhea americana is the largest bird of the Americas, and because of this, it has several nicknames, including the “American ostrich” or the “Pampas ostrich.” The greater rhea lives on the pampas (plains) of Brazil, Bolivia, and Argentina. The lesser rhea is found in the Andean foothills of Peru.

The rhea has three toes, and it does not have a hind toe (hallux). Rheas have long legs and necks, and they are 4 to 5 feet tall. Unlike the ostrich, the neck of the rhea is feathered. Rheas weigh 70 to 90 pounds. The male is larger than the female, and their diet consists primarily of roots, seeds, insects, lizards, and some small mammals. The male has a harem of 6 females, and each female lays about 15 to 18 eggs. In the United States, they lay eggs from late spring until fall. The male does the incubation of the eggs, which are laid on the ground in a nest called a scrape. Incubation lasts 30 to 43 days and the male continues to tend to the chicks until they are 4 to 5 months of age. The rhea is raised for its meat, feathers, and hide.

KIWIS

The kiwi is from the order Apterygiformes and the family Apterygidae. There are three species of kiwi: the little spotted kiwi (Apteryx oweni), the great spotted kiwi (Apteryx haastii), and the brown or common kiwi (Apteryx australis). The kiwi is the smallest ratite and is a nocturnal bird. The kiwi is the national bird of New Zealand and is now a protected species there.

They inhabit dense forests, wetlands, swamps, and moist forested areas. Hunting and the introduction of mammals from outside New Zealand has devastated the population.

The kiwi is sometimes called the “woodcock ostrich” because it has a long, slender, curved bill with nostrils at the tip which aid in their well-developed sense of smell. They use their excellent sense of smell along with their toes, which have tough claws, for excavating earthworms (their primary diet) and other small invertebrates at night. Because they are nocturnal, they have poor eyesight but a well-developed sense of hearing. They spend much of the day underground in burrows which are lined with twigs, grass, and feathers. The kiwi has hair-like feathers, and very small wings hidden beneath these feathers, which create a sleek, contoured appearance. The kiwi is only 15 inches high, weighs anywhere from 2 to 10 pounds, and has no tail.

The kiwi lays the largest egg in relation to body size. The egg weighs 1 pound (454 grams), which is approximately 10 percent of its body weight. The female lays one or two eggs between July and February in New Zealand; in this country, they lay eggs from late fall to spring. They have both a right and left functional ovary, unlike other birds which have only a left functional ovary. The incubation is 75 to 78 days and is done by the male. When the chicks hatch, they are not fed for 6 to 12 days. Chicks are feathered at hatch and are not covered by down. The birds do not breed until the age of 5 or 6. Since kiwis are protected, they are not raised commercially.

CASSOWARIES

The cassowary belongs to the order Casuariiformes and the family Casuariidae. They are native to New Guinea and Australia. There are three different species of cassowaries. The “double wattled” cassowary is 6 feet tall and is found primarily in New Guinea and the rain forest of northeast Australia. The “single-wattle” cassowary is 5 feet tall and can be found in the coastal swamps of New Guinea, while the “dwarf” cassowary, which is only 3½ feet tall, is found in the mountain forests of New Guinea.
Cassowaries have adaptations which protect them from the dense undergrowth. For example, the feathers on their wings are only quills and are very coarse so that they are not easily damaged from the vegetation. Another adaptation is the "casque" on the top of their head, which is a flattened bony "crown" that protects the head while allowing the cassowary to part vegetation with it.

The adults have a sharp claw on the innermost toe which is used for defense. They also have thick double feathering which gives them added protection. They eat primarily fruit and leaves.

Cassowaries are monogamous, live in pairs or family parties, and each pair defends the territory during breeding season. The greenish eggs are laid from May to September in New Guinea and Australia and from late fall to early spring in this country. There are usually three to eight eggs in a clutch. The male does the incubation and brooding; the incubation period is 49 days. The cassowary is not being developed for the commercial market.

**EMUS**

Emus are in the order Casuariiformes and the only existing member of the family Dromaiidae. They are natives of Australia and are the second largest living bird. They stand 5 to 6 feet tall and weigh in the range of 110 to 140 pounds. The female is larger than the male. They are widespread on the Australian continent and considered a pest by some farmers because they can destroy fences while seeking cultivated crops. They have been hunted to extinction on some of the islands surrounding Australia. The emu has three toes and a bill, which is soft and broad and adapted for browsing and grazing. They feed on fruits, flowers, insects, seeds, green vegetation, caterpillars, beetles, and grasshoppers.

Each gray, hair-like feather has two identical shafts with barbs that do not interlock to form the traditional feather vane. The blue skin on the neck is not covered with feathers. The emu is a shy bird and can travel in excess of 30 m.p.h. to escape confrontations, and their long legs carry a powerful kick. Emus are also good swimmers.

The female emu lays a clutch of 9 to 12 dark green eggs and the male does all the incubation of the eggs. Each egg weighs 1 to 1½ pounds and the incubation period is 56 days. The proper incubation temperature is 91 °F. The chicks are hatched and they leave the nest after 2 to 3 days. The emu reaches sexual maturity at 2 to 3 years. They usually breed from May to August in Australia; in the United States, the emu breeds from October to May.

The emu is grown commercially for its meat, feathers, hide, and oil. The oil is used by the Australian Aborigines as a healing agent, anti-inflammatory agent, and as an analgesic (topical pain killer).

**OSTRICHES**

Ostriches are of the order Struthioniformes and the family Struthionidae. There is only one species of ostrich, *Struthio camelus," camel bird."* The ostrich is the largest bird, with the adults usually reaching 6 to 8 feet in height and weighing 250 to 400 pounds. Despite their size, they can run about 40 m.p.h. Ostriches are the only ratite that have two toes, which are adapted for running and walking. They also have a very powerful kick. One toe has a long nail, which is used to lash out at predators. Although the ostrich originated in Asia, it is considered a native of Africa. There are several subspecies of *Struthio camelus.* The Arabian ostrich, which was common in the deserts of Syria and Arabia, was hunted to extinction for sport and for its plumes. The southern subspecies is found primarily in southwest Africa and Angola. There are two subspecies with red necks, the North African ostrich (S. c. camelus) and East African ostrich (S. c. massalcaus), found primarily in Northern Africa. There are two blue necked ostriches, the Somali ostrich (S. c. molybdocephalos)—found in the bush country of Kenya, Ethiopia, and Somalia—and the South African ostrich (S. c. australis). The Masai ostrich, another subspecies, is found in Kenya and Tanzania.

The male ostrich is larger than the female and has black body feathers with a brownish rump and white wing and tail feathers. The females have brownish-gray body feathering. Ostriches have keen eyesight. Ostriches are omnivorous. They primarily eat plants, fruits, seed, leaves, shoots, and succulents but will eat invertebrates and lizards as well.

Ostriches are polygamous; there can be one male for four or five females. The breeding season is from March to September in the United States. In the wild, the nests are shallow pits dug in sandy soil with a clutch of 12 to 36 cream-colored eggs. Commercially, ostriches are raised in pairs or trios, and each hen lays between 40 to 60 eggs. The ostrich egg is the largest egg. It weighs approximately 1.4 percent of the female’s body weight at about 3 pounds, with a shell that is 2 millimeters thick. The incubation period lasts 42 days. The hen incubates the eggs during the day, while the male incubates the eggs at night. Commercially, eggs are placed in incubators. The young are precocial, and at one month of age they can run as fast as an adult.
Ostriches have been raised commercially in South Africa since 1850. The United States had a commercial ostrich industry based on the feathers until 1930, but the Great Depression and changes in fashion resulted in its demise. Recently, there has been a renewed interest in the commercial ostrich industry. Ostriches are now being raised for their feathers, meat, and hide. Ostriches are processed at 12 to 14 months of age and produce about 80 pounds of boneless meat, 15 square feet of hide, and about 3 pounds of feathers. The meat is red in color, low in fat and cholesterol, and high in protein.

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THE COMMERCIAL POULTRY INDUSTRY

INTRODUCTION
The commercial poultry industry is divided into three main divisions, the turkey industry, the chicken meat or broiler industry, and the egg industry. The rise of the commercial chicken and egg industries began when chicken farmers decided to raise separate breeds of chickens for egg production and meat production. Today, the breed most commonly used for commercial egg production is the Single Comb White Leghorn, while the modern meat-type chicken or broiler comes from a cross between a White Plymouth Rock hen (female) and a Cornish cock (male). The turkey industry primarily uses a strain of bird called the Beltsville White.

HISTORY
The commercial broiler industry was begun in 1923 by Mrs. Cecile Steele in Sussex County, Delaware, when she started a flock of 500 chicks and sold them when they reached 2 pounds. The following year, she started 1,000 birds, and by 1926 she was producing 10,000 birds under one roof. These early broilers were actually heavy laying breeds like New Hampshires, Rhode Island Reds, Barred Plymouth Rocks, or White Plymouth Rocks.

Commercial flocks of 1,000 or more hens began appearing on the east and west coasts in the 1870's. During the 1930's, Petaluma, California, became one of the most intensive egg producing areas of the country. California produced so many eggs, which were shipped all across the country, that Petaluma became known as “The Egg Basket of the World.” By the 1960's, with the promotion of contract production and an excellent transportation system for grains, much of the industry shifted to the Southeast, although California still remains one of the largest commercial egg producing states.

One could say that the turkey industry began with the first Thanksgiving in 1621, where wild turkey was served. In fact, the modern turkey industry relies upon a type of bird that owes its origins to the Broad Breasted Bronze, the White Holland, and the Beltsville White. The turkeys used by the turkey industry today are not designated by breeds or varieties, but by strains such as the “large,” “medium,” and “small” type of hybrid white crosses. White turkeys are used because when the feathers are removed, there are no dark or black pin feathers left in the skin.

PRODUCTION AND MARKETING
In order to reach a decision to enter into poultry production, careful consideration must be given to the products being produced, types of markets available for those products, the demand for those products in the area to be serviced, and the scope of the production unit planned. The poultry industry is a vertically integrated industry. Vertical integration is a marketing term that means combining related marketing functions and decisions into a single firm. This means that one company controls the feed mill, hatchery, breeder flocks, growout flocks, processing, marketing, and sales of the product. Vertical integration allows for a shorter, more direct movement of the product from the farm to the table.

The poultry industry also uses a contract production system. In a contract production system, a grower of the birds enters into an agreement with a poultry company to provide the land, housing, utilities, and management skills required to raise broilers, turkeys, or egg producing chickens. The company owns the birds put onto the farm, provides the feed, veterinary care, and guidance to the farmer. The company also agrees to pay the farmer so much per pound of chicken or turkey meat produced or so much per dozen eggs.

Today, the commercial poultry industry produces more meat and eggs on fewer farms because of careful genetic selection, advanced nutrition programs, developments in better housing, and carefully supervised management systems. Achieving higher production levels with fewer sources is a situation known as an economy of scale.

CAREERS
Since the world will always need food, food industries such as the poultry industry will always be looking for well-educated individuals to carry it into the 21st century. Poultry is America’s choice because of its nutritional value and because of its cost efficiency.

Since the poultry industry is such big business, there is a wide variety of occupations to support it—people are needed to manage breeder farms, hatcheries, feed mills, and processing and packaging operations. Those are just a fraction of the jobs available: Consider the transportation, animal health, marketing, sales distribution, technical
support, construction, maintenance, education, accounting, training, and administrative activities needed to keep the poultry industry moving ahead.

There are also allied industries that provide financing, equipment, pharmaceuticals, supplies, computer support and services. Here are some examples of careers available in the poultry or allied industries:

- Advertising/Public Relations
- Bioscience/Biomedicine
- Business Management
- Computer Science/Data Management
- Distribution/Sales/Marketing
- Poultry Health/Veterinary Medicine
- Food Science/Food Safety
- Product Development/Quality Control
- Government Agencies
- Growout/Breeder Management
- Home Economics
- Live Production
- Personnel
- Pharmaceutical
- Engineering
- Poultry Nutrition
- Genetics
- Research/Teaching/Extension

**Field Operations** - If you feel that living and working close to nature is a rewarding way of life, you may choose a career that lets you do just that. There are many field-related jobs such as breeder manager, growout farm manager, flock supervisor, hatchery manager, or feed mill manager. Billions of birds and tremendous capital investment are required for today’s modern poultry production.

**Research and Technical Support** - If you dream of making discoveries that can change the world, then the poultry industry can be a dream come true. The results of research and scientific development are put to work in the industry almost every day. Scientists are continually studying biotechnology, genetics, nutrition, vaccines and disease control, waste recycling, environmental protection, quality control, food safety, and product development.

**Sales and Marketing** - If you’re a creative, imaginative “people person,” a form of marketing communications like advertising or public relations would be an excellent career challenge for you. The poultry industry employs sales or marketing management professionals.

**Computer Science** - The poultry industry also needs individuals who are familiar with computer programming, information systems, or database management. Every facet of the poultry industry is computerized—from feed mills and hatcheries to processing plants and distribution. Modern poultry houses also have sophisticated computer management systems to monitor ventilation and temperature.

**Business** - The poultry industry offers job opportunities in management, finance, accounting, engineering, purchasing, and personnel.

**Allied Industries** - A career in poultry doesn’t necessarily mean you’ll be working with animals. Allied industries provide supplies, products, or services to the poultry industry. Examples include jobs in the pharmaceutical industry, feed milling, equipment manufacturing and sales, distribution, government, and teaching.

**The World Poultry Market** - Because the poultry industry is so diverse, it’s possible to find a job close to home, across the country, or around the world. To keep up with increasing consumption and expanding world demand, poultry production is growing and so are the job opportunities.

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THE CHANGING WORLD OF POULTRY AND EGG MARKETS

Definitions:

Demand - the quantity of a product that consumers/buyers desire. “Quantity” is the amount of the product that consumers will buy at a given price.

Embargo - governmental order that has the effect of completely limiting trade between one country and another.

Promotion - the act of publicizing a product, in order to increase sales or visibility.

Sanction - governmental trade prohibition on specific products and/or services to another country. Sanctions can be thought of as partial embargoes and are often enacted due to nuclear proliferation violations or human rights violations.

Supply - the quantity of a product that the market can offer. “Quantity” is the amount of product the producer will sell at a given price.

Tariff - the tax on goods either being imported or exported from a country

Trade - the buying or selling of goods and/or services

A fundamental of business is the law of supply and demand. In the simplest of terms, this refers to the observed relationship that as demand for a product increases, prices go up. Then as prices go up, new suppliers enter the arena and increase the supply of the product, which brings the price back to normal.

It might seem obvious that poultry producers could predict the demand for eggs or poultry meat, based on historical data and the projections made by economists. The producers could then have the flock sizes to address the demand in such a way that producing the eggs or meat would be profitable. This would generally work in a perfect world (or regulated market, such as the quota system used in Canada) where all producers cooperated and there were no unexpected changes in flock sizes. However, the United States egg industry operates in a “free market” economy. As egg prices have risen to particularly good levels, existing producers have increased their flock sizes, put surplus eggs in the market and ruined the profitable egg market.

It is also important to remember that in the United States, the cost of egg and poultry meat production is not uniform across the country. Producers far removed from the states producing the feed grains, are at a disadvantage. Those producers without in-state supplies of feed grains, pay to transport the needed corn and soybean over great distances. Conversely, egg producers from grain producing states who export eggs must add the cost of transportation to their cost of doing business.

Legislation related to the management of farm animals can also impact costs of production. On January 1, 2015 a law on Standards for Confining Farm Animals went into effect in California. The law states that each laying hen be able to extend its limbs fully and turn around freely. Following the passage of this legislation in 2008, California egg producers significantly reduced their hen numbers in order to allow for the freedom of movement dictated in the new law. This, of course, reduced the in-state supply of eggs and egg prices rose.

Unforeseen circumstances, unrelated to producer or voter decisions, can also severely impact the supply of a product. In 2015, outbreaks of Highly Pathogen Avian Influenza (HPAI) hit the United States and were devastating to both the egg and turkey industries. Not only did in-store prices for poultry and eggs increase, changes in restaurant menus and meal times were thrown upside down. For example, some chains removed egg or poultry items from their menus, while others reduced the hours they offered a breakfast menu (read “meals with eggs”).

As our world changes and more countries grow into the category of “developing countries,” markets evolve. In general, as populations shift from rural areas to cities and as per capita income increases, so does the demand for animal protein. However, a developing country often lacks the infrastructure to immediately meet this growing demand for animal protein, including eggs and poultry meat. This can be an opportunity for the poultry industries in the United States to begin or increase their exports to those areas.
When dealing with international markets, however, the law of supply and demand is often complicated by politics. An often cited example dates back to the 1960s. In the early part of that decade, European countries put high tariffs on imported chicken. This became known as the “chicken tax.” The main target was the sale of American products in West Germany. U.S. Pres. Lyndon Johnson responded to this action by placing a tax on imported vans and trucks. His target was the importation of Volkswagens into the United States. The “chicken tax” is still around, with European tariffs on imported chicken and American taxes on imported vans.

It often appears that some governments use the opportunity of a disease outbreak in the country of a political foe, to impose a ban. In 2015 the Chinese government banned the import of all U.S. poultry and egg products, citing the detection of HPAI in the U.S. This nationwide ban was contrary to international guidelines. Fortunately, most U.S. trading partners only banned poultry and eggs imports from the regions of the U.S. where HPAI outbreaks had been confirmed.

Sometimes trade decisions are even more perplexing. In 2003, Mexico banned all poultry imports from California, citing the outbreak of Exotic Newcastle Disease in California, as the reason for the ban. California producers were outraged, for they knew full well that Newcastle Disease is endemic, or always present, in Mexico!

Due to their nutritional and food quality attributes, as well as their freedom from religious taboos, poultry and eggs will continue to be in demand around the world. How those products are traded will often depend more on politicians than on consumers.

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Biosecurity

Biosecurity is a relatively new term that includes specific steps taken to prevent disease caused by infectious agents such as viruses, bacteria, fungi, or parasites in poultry flocks. Biosecurity includes practices that keep infectious agents off of your premises through isolation rearing and reducing disease-causing agents already on your farm through proper sanitation and disinfecting practices. Biosecurity is not just for the commercial producer of poultry, it is for ALL poultry producers.

Disease Transmission

Disease is the departure from health and includes any condition that impairs normal body functions. Disease results from a stress which weakens the bird and reduces the bird’s resistance to infectious agents. Infectious agents — such as viruses, bacteria, fungus, or parasites that cause disease in poultry — can be introduced into a flock or transmitted by:

- Birds carrying an infectious agent within the flock;
- Recently acquired birds;
- Eggs from infected breeders;
- Human hands, hair, feet/shoes, or clothes;
- Wild birds, rodents, flies, parasites, or insects;
- Contaminated feed, water, or air;
- Contaminated vaccines and medications;
- Dust, feathers, and manure on equipment and supplies, such as trucks, coops, feeders, waterers, and egg flats.

Increased Risk

The risk of disease increases if a) new birds are introduced into your existing flock, b) different ages of birds are raised together, c) different types of fowl are raised together, and d) new birds are placed in contact with droppings, feathers, dust, and debris from a previous flock. Infectious agents usually only survive a short time, but if maintained in the proper environment such as cold, damp, unsanitary surroundings infectious agents can survive for a long time and travel hundreds of miles while clinging to drivers, trucks, crates, or egg flats.

The table on the back of this page lists common poultry diseases, their symptoms, and the survivability of the infectious agent which causes the disease.

Enforcing Biosecurity and Disease Prevention Measures

“Security” is the primary emphasis of any insurance program and this holds true for biosecurity. Security entails minimizing the number of visitors on your farm. Only authorized personnel who have been provided properly sanitized footwear, coveralls, and headgear should be allowed into your poultry houses. As caretaker, you should only visit other poultry facilities when absolutely necessary and then wear properly sanitized clothing, headgear, and footwear.

It is important to isolate new birds that are brought onto the premises before introducing them into the flock. Keep free-flying birds, waterfowl and migratory birds away from your flock. Your management should include a rodent and fly control program.

Ensure proper biosecurity by keeping only one age of bird on the premises at one time. Since small flocks generally have more than one age of bird on the premises, it is important to house different ages separately. Always take care of your young birds first, then move on to your older birds. Ideally, one should not keep various types of fowl, including pet birds, on the premises. If you keep other types of animals or birds on the premises, it is important to change coveralls, head-gear, and footwear from one animal facility to the next.

To avoid transmitting disease, thoroughly clean, wash, and disinfect any equipment such as feeders, waterers, coops, or egg flats, as well as equipment that has been on another farm, on a routine basis. Included with equipment are vehicles which come onto your farm, especially those which have been at other poultry facilities. Use only plastic coops since they are easier to wash and sanitize and do not harbor bacteria like wooden crates. Do not allow dead birds to accumulate; either compost or burn dead birds. Poultry houses should be thoroughly washed and disinfected at least once a year.
Another disease prevention measure is to have good ventilation, since large amounts of fresh air reduce infectious disease agents. Always do business with companies and other farms which enforce proper biosecurity measures. Biosecurity is a worthwhile investment for any poultry producer and it is the best insurance policy money can buy.

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<td>Weeks</td>
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<td>Mycoplasma</td>
<td>Chronic respiratory problems</td>
<td>Mycoplasma</td>
<td>Days</td>
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<tr>
<td>Salmonella</td>
<td>Diarrhea</td>
<td>Bacteria</td>
<td>Weeks</td>
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<tr>
<td>Avian TB</td>
<td>Weight loss, death</td>
<td>Bacteria</td>
<td>Years</td>
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**Avian Influenza**

Influenza is an acute contagious respiratory disease caused by a virus. Influenza can affect many animals such as horses, swine, and human beings. It is a disease with worldwide distribution and has been a costly disease to the poultry industry because of increases in production expenses which include extra feed, medication, additional care, quarantine measures, vaccines, cleaning and disinfection, decreases in carcass quality as well as losses of local and international trade.

Migratory waterfowl, imported pet birds, and live-bird markets are some of the sources of infection. Influenzas can be zoonotic, which means the disease can be transferred from animals to humans. Influenza is commonly referred to as the flu. The term “fowl plague” was used in the past when referring to avian influenza outbreaks resulting in high mortality. Today, an outbreak of avian influenza that results in high mortality is referred to as “highly pathogenic” avian influenza (HPAI).

Avian influenza can affect poultry (chickens, turkeys, ducks, pheasants, geese, guinea fowl, and chukars) as well as wild birds especially sea birds (sandpipers, sanderlings, ruddy turnstones, terns, swans, shearwaters, herons, guillemots, puffins and gulls). Avian influenza is caused by any Type A influenza virus belonging to the Orthomyxoviridae family. The disease syndromes associated with avian influenza can be subclinical or mild, meaning the bird is in the early stages of the disease and the signs of the disease are not apparent, to acute where the signs of the disease are severe and often lead to death. Many factors influence the outcome of infection. Some factors which determine whether the disease will be subclinical or acute are the biologic characteristics of the virus, environmental stresses, such as temperature, humidity, ventilation, crowding and the age and sex of the bird.

Avian influenza can be transmitted via air currents, feces, humans, vehicles, water, feed, equipment, supplies, clothes, flies, litter, beetles, and other birds dead from the disease. Transmission occurs when susceptible and infected birds are in close contact with each other or when infectious material from infected birds is introduced into the susceptible bird’s environment. The virus can be excreted from the respiratory tract, conjunctiva, and feces of birds. This is known as horizontal transmission. There is no evidence to indicate avian influenza is transmitted vertically, from hen into the egg. Since the virus is readily transported by people and equipment, it is important to establish strict biosecurity measures.

Once avian influenza is transmitted, the incubation period, the time from when the bird first comes in contact with the disease until the first signs appear, can be a few hours to 3 days and up to 14 days. The incubation period is dependent on the dose of the virus, route of exposure, the species exposed and the ability to detect the clinical signs.

The clinical signs for avian influenza can vary widely depending on the species of bird affected, the age of the bird, whether the bird has another infection concurrently, the strain of virus, and environmental factors. The respiratory, reproductive, digestive, or nervous systems of the bird are affected with respiratory signs being most common. The most commonly reported signs of the disease are pronounced depression, decreased activity, decreased feed consumption and emaciation, with decreased egg production and increased broodiness in hens. Respiratory signs include coughing, sneezing, rales (abnormal respiratory sounds), excessive lacrimation (tearing) from the eyes, huddling or ruffling of feathers, along with edema (accumulation of fluid) of the head and face, cyanosis (turning blue due to lack of oxygen to the tissues) of unfeathered skin (legs, combs, wattles), nervous disorders, and diarrhea. These signs may occur alone or in any combination depending on the severity of the disease. All birds in a flock will become sick (moribund) but morbidity (death) will vary from very low to 100% depending on the strain of virus, the species affected, and other environmental factors.

To determine the causative agent of any disease, including avian influenza, the causative agent must be identified. In the case of avian influenza, the virus must be isolated and identified. The virus can be recovered from swabbing the trachea, and/or cloaca of live or dead birds or taking samples of every organ from dead birds. Also, blood can be taken from live birds and used to demonstrate the presence of antibodies to the avian influenza virus.
There is no practical treatment for avian influenza. Infected flocks must be quarantined by state animal-disease regulatory agencies and procedures recommended by the National Poultry Improvement Plan (NPIP). Quarantine continues until the flock is depopulated. All buildings should be cleaned and disinfected after the poultry have gone. Poultry litter/manure should be composted before application to cultivated lands. Any treatment for avian influenza is supportive and tries to relieve the respiratory distress. Antibiotics are not effective against viruses and are only used as supportive treatment for avian influenza to reduce the effects of secondary infections caused by bacteria or mycoplasmas.

Prevention is the only practical approach to avian influenza. Biosecurity should be the first line of defense in the prevention, and since other birds are the most likely source of infection, it is important to keep susceptible birds away from infected birds’ excretions and secretions. Transmission occurs when birds are introduced to contaminated footwear, clothing, vehicles, insemination equipment, feed and water that have been exposed to avian influenza virus. The presence of the virus in fecal material is a likely means for movement by equipment and people. Another approach is serological monitoring at harvest of turkeys and chickens.

References: