

in a bath containing 2 ounces of wettable sulfur per gallon of water. If spot treatment on a few birds is all that seems necessary, a sulfur ointment can be rubbed into the affected areas of the skin. The ointment can be prepared by mixing 1 tablespoonful of flowers of sulfur in one-half cup of lard or vaseline.

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Diseases of Ducks

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DUCKS are waterfowl and scavengers by nature and are relatively resistant to many common diseases of birds.

The large, modern, commercial duck ranch is a long step from nature, however. Confinement creates such problems as a damp, ammonia-laden atmosphere; rapid spread of some diseases that are almost unknown in wild ducks (paratyphoid, scrostitis, and fowl cholera); heavy insect populations; and leg weakness.

On the other side of the ledger, confinement rearing (with a controlled water supply) has all but eliminated western duck sickness (botulism), parasitism, and attack from predatory animals, which are scourges of wild ducks.

The duck rancher has to provide an escape for moisture to prevent ammonia burn. To accomplish that he replaces the litter daily or provides wire floors over washable pits on at least part of the building. Other problems, such as botulism, have been solved by the use of pelleted feed and a constant water level.

Flies can be controlled by modern chemicals. They must be checked before use, however, because some of the thiophosphates, which are safe to use in chicken houses, are highly toxic to ducks.

PARATYPHOID, or keel, is an infectious disease of young ducklings (also of turkeys and other birds). It is caused chiefly by a bacterium, *Salmonella typhimurium*, and to a less extent by other species of salmonellas. Mortality is usually low (less than 10 percent) on Long Island, but poor incubator and brooder management increase the death rate.

The name "keel," which stems from early observations that the ducks suddenly keel over when dying, is misleading. Often the ducklings become dehydrated and emaciated and die slowly. They may gasp for air or tremble, as though chilled.

The common lesions are small, white spots on the liver, cheesy plugs in the blind gut, and a thickening of the wall of the large gut.

The best preventive measure we know of is to fumigate the eggs during early incubation and the hatching unit between hatches. Potassium permanganate and formalin are recommended.

Potassium permanganate crystals should be used at the rate of one-half ounce (weighed) and 1 ounce of formalin (measured) to every 80 cubic feet of incubator or hatcher space. The potassium permanganate crystals are placed in an earthenware vessel

with a capacity of 1 pint for each ounce of formalin required. The vessel is placed on the floor of the machine and the formalin poured over the crystals. The doors and vents should be closed for 15 minutes. This procedure should be followed in the incubator 3 to 5 days after each new lot of eggs is set, and in the hatcher between hatches after the hatcher has been cleaned. Fumigation should not be done while the ducklings are hatching. The farmer should not inhale the fumes and should handle the poisonous formalin carefully.

Treatment consists of rigid culling and sulfonamide medication in the feed or drinking water. NF-180 can be used in the feed at the rate of 2 pounds to the ton for a week to 10 days. Sulfamethazine can be used in the drinking water at the rate of 1 ounce (2 table-spoons) to the gallon of drinking water for 2 days; the treatment can be repeated after 4 days, if necessary.

The ducks should be kept on clean bedding, because *S. typhimurium* may be found in the feces of affected ducks and can be transmitted by ingestion of infected material. The bacteria can live 28 weeks in feces. Thorough cleaning and disinfecting of the brooder house after removal of an infected flock therefore is important.

VIRUS HEPATITIS—baby duck disease—is a highly fatal virus disease of young ducklings. It runs rapidly through a flock and kills many. The dead and dying birds are found with their heads thrown back.

The disease was first discovered in white pekin ducks on Long Island in January 1950. The virus since has been isolated from wild ducks (mallards) on Long Island and from domesticated ducks in Massachusetts, western New York, Illinois, and England.

Losses up to 90 percent are common and occur within 2 days of the first death. The biggest ducklings in a flock die first and without warning. Individuals are dead 30 minutes after showing the first signs. They lie on

their sides with their heads thrown back. The feet may paddle as though they were swimming, and the beak often is purple. Lesions consist of small hemorrhages on the liver and mottling of the spleen and kidneys.

Treatment with serum from ducks that have recovered from the disease has been used successfully. A serum bank sufficient to treat many thousands of ducklings is maintained on Long Island. The bank consists of about 2 million milliliters of blood serum collected at slaughter from ducks that had the disease and recovered. The serum is separated from the clots and treated with a preservative. The serum is then stored under refrigeration and issued, as needed, to the duck farm.

Geese, muscovies, chickens, turkeys, and game birds reared in contact with infected ducks have failed to show any evidence of the disease.

ASPERGILLOSIS, a respiratory disease of young ducklings, is caused by the fungus *Aspergillus fumigatus*. It is also known as brooder pneumonia and gaps. Ducklings less than 2 weeks old are most susceptible, but the fungus has been found growing in the air sacs of ducks of all ages, including breeders.

Affected birds gasp for air and the head and neck are extended. Many become weak and actually may die of thirst.

Cheesy nodules, from pinpoint size to one-eighth inch across, occur in the lungs and air sacs. The filamentous type of growth, similar to that seen on moldy bread, may be present in the air sacs of older ducks.

Moldy litter, the most common cause of an outbreak, should never be used for young ducklings. Moldy feed should be avoided. Every effort should be made to keep the area around the water fountains dry through the use of wire platforms and drains.

Treatment of individual birds is unsatisfactory. The litter in affected pens should be removed or covered with fresh litter.

INFECTIOUS SEROSITIS—*anatipestifer* infection or “new duck disease”—is so widespread as to be the most important disease problem of the duck industry. It is a bacterial disease caused by *Moraxella anatipestifer*.

The symptoms are coughing, staggering, and loss of equilibrium. Frequently the ducks lie on their sides or backs and paddle their feet. Death often is due to water starvation, rather than to the primary infection. Loose green and white droppings are common in a pen of affected ducks. Losses up to 75 percent have been recorded.

The characteristic lesion consists of a cream-colored, gelatinous membrane, one-sixteenth inch or more thick, over the heart and liver. The air sacs may contain a yellow, cheesy exudate. The liver and spleen are enlarged. Hemorrhages may be present beneath the capsule of the liver.

Terramycin suspension in oil gives good control for about 5 days. The treatment consists of injecting the drug under the skin of the neck at the rate of 12.5 milligrams per pound of body weight. Treatment may have to be repeated.

Sulfa drugs have been widely used, with varying results. One and one-half pounds of sulfaquinolaxine per ton of feed is the recommended level. The ducks should be starved for 4 to 6 hours and the medicated feed given for the remainder of a 24-hour period. This treatment may be repeated if necessary.

FOWL CHOLERA—pasteurellosis—is an infectious bacterial disease of ducks and other birds. The cause is a bacterial organism, *Pasteurella multocida*.

Chickens, turkeys, geese, and other species are susceptible.

Losses from fowl cholera are seldom seen in ducks under 4 weeks old. Affected ducks are hot to the touch, the skin is usually red, and the healthy birds in the flock frequently pick the feathers from the sick and dying birds. Swollen hock joints may be seen in flocks following an outbreak of fowl cholera.

Hemorrhages usually are found on the heart. Cheesy masses may be seen in the air sacs and on the heart. The liver and spleen are enlarged and mottled. Small, white spots may be found in the liver. The blood vessels of the intestines and other organs are engorged with blood.

Diagnosis must be made by isolation and identification of the causative organism, since the lesions of fowl cholera and infectious serositis are easily confused.

Fresh drinking water and clean quarters appear to be of some importance in the control of cholera in ducks. Bacterins consisting of either chemically killed or heat-killed liquid cultures of *Pasteurella multocida* have been used successfully. Two doses of 1 to 2 milliliters (determined by the size of the duck) of duck-origin bacterin a week apart are inoculated intramuscularly at least a week before an anticipated outbreak. The egg-embryo vaccine is more effective than broth bacterins for the control of the fowl cholera in ducks.

Treatment with sulfonamides is of some value, but not all outbreaks respond to it. Terramycin oil, as given for infectious serositis, is effective for short periods.

Ducks dead of cholera should be burned or buried deep, because the cholera organism can survive for long periods in carcasses.

LEUCOCYTOZOON infection has not been reported in the duck-growing area of Long Island, but it is a major problem in some areas of the United States where the blackfly (*Simulium*) is present in large numbers.

The disease is caused by a protozoa, *Leucotozoon simondi*, which attacks the blood cells.

Affected birds may exhibit thirst, become weak, and be highly excitable. Death usually occurs a few hours after symptoms are noted.

The blood is thin and does not clot readily. The spleen may be swollen and dark or mottled.

Control consists of rearing ducks in a screened area or discontinuing production during the blackfly season.

No adequate treatment is available.

BOTULISM—limberneck—is poisoning caused by the toxin formed in putrefying animal and vegetable matter by the growth of bacteria known as *Clostridium botulinum*. When the toxin is consumed, the ducks develop a paralysis of the neck muscles (limber neck), and the feathers become loose.

Diagnosis is made by finding the toxin in the blood of sick ducks; to do that, the suspected serum is inoculated into immune and nonimmune mice.

Pellet feeding, maintaining a constant water level in streams and ponds, and prompt removal of all dead animals and birds aid in the control.

The treatment of the birds with antitoxin is recommended only when the individual value of the bird is high.

COCCIDIOSIS is a minor problem in ducks, although some outbreaks, with losses up to 24 percent, have been reported.

External parasites of ducks include the duck louse (*Anatococcus dentatus*), which is frequently found on the heads of breeding birds on Long Island. Control consists of dusting 5-percent DDT under the feathers on the head of the affected ducks at the time of selecting breeders.

INFLAMMATION of the eye, eyelids, and the mucous membranes of the nose and throat resulting from ammonia fumes generated in feces is common in ducks. Frequent removal of the litter and good ventilation are the best control measures.

SALT POISONING—the toxic level for salt is 2-percent sodium chloride in the feed, 4,000 parts per million in the drinking water, or any combination.

High salt levels depress growth in ducklings and lower the fertility and hatchability of eggs of breeder ducks.

FOREIGN BODY PENETRATION—ducks are known for their habit of eating shiny objects. Nails, wire, screws, and other objects that are ingested penetrate the gizzard or intestine. Special care must be exercised to remove such objects from pens or yards, especially after making repairs on buildings that house ducks.

SUCH CONDITIONS as prolapse of the oviduct and paralysis of the penis occur in breeding flocks. The true cause of these conditions is unknown. Forcing the birds into production is thought to play a part.

All birds thus affected should be removed from the breeding flock immediately, so as to prevent the development of cannibalism. Ducks that have a tendency to prolapse of the oviduct or paralysis of the penis should not be used in a breeding flock, even if they recover.

Impaction of the oviduct may occur as the result of infection or other unknown causes, which prevent the movement of partly or fully formed eggs down the oviduct.

Internal layers are found occasionally in laying ducks. Reversed peristalsis in the oviduct deposits the fully formed eggs in the abdominal cavity.

Ascites, or water belly, is a common condition in ducks. The accumulation of fluids in the abdominal cavity is usually the result of interference with the circulation of blood through the liver.

The incidence of tumors in domestic ducks is extremely low. Tumors of the liver, lungs, kidneys, and oviduct have been reported in ducks.

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