

Poultry Pathology

Respiratory Diseases

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THIS comprises a group of diseases usually most prevalent during the fall and winter months. Many times diagnosis is difficult due to the similarity of symptoms of many of the disorders. In many instances this group of diseases is predisposed by faulty management or by nutritional deficiencies, particularly Vitamin A.

Simple Colds—Nasal Catarrh

This condition is a mild catarrhal inflammation of the nasal passages and is common to all species of domestic birds. In general, no definite cause may be given for this condition; however, the predisposing factors are excessive exposure to rains, dampness, drafts, overcrowding and general faulty management. Weak or under-nourished birds are more susceptible than thrifty birds.

Symptoms. Slight nasal discharge, thin and watery in consistency, inappetence, droopiness, reduced egg production.

Control. In general, relief is secured by correction of faulty management factors and careful sanitation. In many cases the condition is improved by addition of Vitamin A to the ration.

Infectious Coryza (Roup)

Roup is a common disease in many areas where poultry is raised extensively. It is most frequently observed in chickens, but may also be seen in turkeys and other species of birds. Younger birds appear more susceptible than older birds. Most outbreaks occur in autumn or fall, from the middle of September to early December.

The name "roup" is popularly applied to a disorder of poultry which involves the upper air passages as well as the eye, and shows evidence of being communi-

cated from fowl to fowl. It is often well to differentiate roup (infections coryza) from such diseases as simple colds, pox, canker or even laryngotracheitis. The disease is caused by a bacteria, *Hemophilus gallinarum*.

Symptoms. The first sign of roup is usually a thin, watery discharge from the nostrils which in a few days turns to a thick flecked mucus. It is sticky and tends to dry around the nostrils making breathing through the nostrils difficult. The discharge has an offensive odor and its accumulation in the nostrils may produce breathing through the mouth accompanied by a snoring or rattling sound. The infection usually involves the mucus membranes of the eye, causing swollen eyelids and enlarged sinuses, thus giving the bulbous deformity of the face and head. The sinuses and eyelids become filled with a caseated plug. The birds show rapid emaciation, are dull and drowsy, and egg production is severely affected.

Lesions. Fowls with roup are commonly quite emaciated. The mucous membrane of the nose, throat and eyes is red and covered with an exudate as already described. The caseated plug found in the sinuses and eyelids is diagnostic even though it may be found in other conditions.

Treatment and control. In general, treatment of the condition is not wholly satisfactory. If treatment is undertaken, it should be as early in the course of the disease as possible. The parts involved, including the nostrils, should be carefully cleaned and the accumulation of exudate removed. A 4 per cent warm solution of boric acid may be used. The installation of a few drops of 10 per cent solution of argyrol may be beneficial. The accumulation of cheesy material under the eyes may be best removed by incisions into

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the sinus and followed by pressing the mass through the wound. The cavity may then be swabbed with a solution of argyrol as mentioned. Inhalent solutions may be used with some success. Recently the Rhode Island Experiment Station has reported good results with sulfathiazole treatment as a preventive for the spread of the disease within a flock. It is recommended that one-half gram of sulfathiazole per ounce of feed be given to all birds, in infected pens, which will eat voluntarily. Individual doses of 1 gm. of sulfathiazole per os is recommended for all birds that do not eat. All non-affected birds are given sulfathiazole at the rate of one-quarter gm. sulfathiazole per ounce of feed for three to four days and then one-eighth gm. of sulfathiazole per ounce of feed until all signs of the disease have disappeared.

The birds from the visibly affected pen should be isolated as many will be carriers and, as a result, further trouble develop. Good sanitation and protection of birds from inclement weather is very important. The disease is favored by overcrowding, and all birds showing symptoms should be removed, destroyed and burned. New stock introduced to a flock, or birds returning from shows and egg-laying contests are possible carriers and should be kept in quarantine before placing them in the flock.

Sinusitis of Turkeys

This is a common condition or disease in turkey flocks in which the sinuses of the head become swollen because they are filled with a mucous-like exudate. Three principal causes have been advanced for this condition. One form is produced by Vitamin A deficient feed; another by the lodging of a piece of grain or other food material in the sinus. The third, or most serious cause, is infection with the organism *Hemophilus gallinarum*.

Symptoms. The first symptoms noticed are a constant shaking of the head of affected birds and discharges found on the feathers over the wings where the bird has attempted to clean its nostrils. These manifestations are followed by a foaming of the eye secretions and by a marked,

clean nasal discharge. In advanced cases, swelling of the sinuses often occurs with closing of the eyes. Emaciation is rapid and secondary symptoms of forced breathing may be noticed. The infectious type runs a chronic course and may exist in a flock for several weeks.

Prevention, control and treatment. An adequate diet containing sufficient Vitamin A will eliminate the possibility of sinusitis from that cause and will further aid in reducing the infectious type.

Treatment by aspirating the mucus from the sinus with the aid of a 10 cc. syringe fitted with an 18 gauge needle one and one-half inches long and injecting into the sinus one and one-half cc. of a 4 per cent solution of silver nitrate or a 15 per cent solution of argyrol has given good results. This treatment is applicable only to early cases. In case of a more chronic nature it is necessary to incise the skin over the sinus and by pressure squeeze out the caseated mass. The opening may then be swabbed with the above mentioned drugs.

Fowl Pox

Formerly, this name was applied only to contagious epithelioma, a disease primarily of the unfeathered portions of the heads of chickens, pigeons and turkeys. Research has proved that this is only one form of fowl pox and that those infectious pathological conditions of the head—avian diphtheria, ulcerative sore eyes and diphtheritic roup—characterized by diphtheritic or caseous ulcerations of the mucous membranes of the eye, mouth, throat, nasal passages and adjacent parts are but different manifestations of the same disease. In view of our present knowledge, it is correct to designate as fowl pox any infection of the head which is characterized by typical pox tumors or by diphtheritic ulcerations. Poultrymen commonly term this latter condition as roup, which is incorrect. The term roup should be used only when the disease process is limited to a catarrhal inflammation of the head characterized by an offensive nasal discharge.

Fowl pox is caused by filtrable virus which localizes in the epithelial pox tumors and pseudomembranes. It is very re-

sistant to drying and to ordinary antiseptic solutions. In a dried state, the virus may remain virulent for as long as four or five years. Diphtheritic forms of fowl pox are usually complicated by secondary invaders which frequently alter the course of the disease and account for the high mortality. Direct contact, ingestion of infected material, or insect bites may be the means of transmission. In some cases the virus may be distributed to susceptible tissues by blood stream infection. Any wound, however small, of the skin or mucous membrane may act as a portal of entry.

Chickens, pigeons and turkeys are susceptible to fowl pox. The disease may occur at any time of the year but is more prevalent during the fall and winter when unfavorable climatic conditions prevail. Improper ventilation, unbalanced ration and unsanitary conditions predispose flocks to infection.

Under favorable sanitary conditions, the incidence of the infection may not exceed 5 or 10 per cent with a mortality rate under 30 per cent of those affected. In other outbreaks, a majority of the birds may contract the disease and over 50 per cent die. Outbreaks showing a predominance of diphtheritic lesions and those complicated with roup cause the highest mortality. Infected fowls may live for weeks provided the lesions do not seriously affect the body functions. Lesions causing occlusion of the respiratory tract may cause sudden deaths. Also, secondary invaders may attain sufficient virulence to result in septicemia with sudden death.

General symptoms. Droopiness, inappetence, difficult respiration, diarrhea, and progressive emaciation may be present but are of minor importance from a diagnostic standpoint. The presence of epithelial tumors or diphtheritic inflammation of the mucous membranes of the head are sufficient to warrant a diagnosis of fowl pox. The pox tumors make their appearance as light-colored specks on the comb or wattles and gradually increase in size until they burst and form ulcers. The exudate from these ulcers dries forming yellowish-brown scabs which, if the bird survives, increase in size during a period

of two to four weeks, finally dropping off as scabs when the ulcers have healed.

Diphtheritic ulcerations of the mucous membranes of the head and throat may or may not accompany the epithelial tumors. Ulceration of the eye ball and conjunctiva, with the accumulation of the caseous deposit, may be present and result in necrosis of the entire eye. The sinuses of the head may be greatly distended with a caseous or diphtheritic mass. Yellowish-white pseudomembranes are commonly found in the mouth and throat and even extending into the adjacent respiratory and alimentary tracts.

Treatment and control. Therapeutic treatment is impractical except in the case of very valuable birds. Surgical and antiseptic treatments of the diseased parts, in conjunction with good care, may enable many to survive. Outbreaks showing a predominance of diphtheritic lesions or those complicated with roup may be benefited by repeated doses of an appropriate bacterin. Birds hopelessly affected should be promptly destroyed. All infected birds should be isolated if possible. Strict sanitary measures should be applied to houses and equipment.

The logical method of control is by vaccination and efficient sanitation. Vaccination has been practiced since 1910 but, prior to 1925, with only partial success. In that year, De Blieck and Von Heelsbergen, Holland, reported the development of a new method of immunization. They demonstrated that by cutaneous vaccination with living virus, active immunity could be produced. Since that time, Pyle, Johnson, Beach, Stafseth, and many others have conducted extensive laboratory and field tests which have confirmed their work. Thousands of flocks in all sections of the United States have been successfully immunized.

Fowl pox vaccine may be prepared from finely ground fowl pox scabs obtained from young cockerels previously inoculated with a known strain of pox virus or from chick embryo propagated virus. In order to preserve the vaccine it is dried and kept under refrigeration.

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My Dad Says:---

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POULTRY *(Continued from page 25)*

It should not be suspended in a diluent until just before using. Mixing of the vaccine and diluent is readily accomplished. The mixture should be shaken frequently while using in order to maintain a uniform suspension. Any of the following methods may give satisfactory results when correctly applied:

The **Scarification-Method** consists of removing a few feathers from the outside of the thigh, scarifying a small area—not over one-quarter inch in diameter—just enough to produce a slight exudate, and then moistening this area with the vaccine.

The **Stick-Method** consists of separating the feathers over the proximal end of the thigh and stabbing—just through the skin in the muscular site—with a scalpel previously dipped in the vaccine. This is probably the most rapid method, but care must be exercised to avoid making too deep a wound. Therefore, the knife blade, with the exception of about one-eighth

inch of the tip, should be guarded with a covering of adhesive tape.

The **Follicle-Method** consists of removing a few feathers from the outside of the distal half of the thigh, pulling the feathers parallel to the lines of insertion to avoid hemorrhage, and with a stub camel's hair brush dabbing some of the vaccine into a few—three to seven—open follicles. Care should be exercised to select large open follicles and to be sure that the vaccine enters them; otherwise a reaction will not occur. This method is probably the most satisfactory from the standpoint of safety and uniformity of reactions.

To be certain immunity is established, a local reaction must be observed. Vaccinated fowl should be examined for reactions during the second week following vaccination. This reaction consists of swelling at the point of inoculation within five to ten days; scabs form and drop off within three to four weeks. Immunity is fully established by the time the scabs disappear. If the reaction is severe, the food consumption may be reduced and the

birds appear less active during the second and third week following vaccination. Generalized pox lesions seldom occur if birds are vaccinated before the combs are large and while they are on range. If a considerable number fail to show a reaction, they should be revaccinated. Only a very small percentage of young birds are normally immune.

While fowl can be vaccinated at any time or age with reasonable safety, the ideal time to vaccinate is while they are young—at least two months old and on range. This permits the reaction to occur before housing and does not interfere with egg production. Also, the fowl will be immune during the season of greatest susceptibility, early fall and winter. Fowl in poor physical condition from any cause should not be vaccinated.

Infected flocks may be vaccinated provided only a small number show infection. Vaccination does not appear to increase the severity of the disease, and when the disease is spreading slowly it may confer immunity before natural infection occurs. Fowl pox vaccine has no curative value. The vaccine should not be used in flocks where the disease has never occurred or is not likely to appear. Vaccinated and unvaccinated fowl should not be mixed until at least two months after vaccination, as unvaccinated fowl may contract the disease from the vaccinated birds.

A vaccine of pigeon pox origin has been advocated by several investigators. Pigeon pox vaccine is capable of stimulating an increased resistance to fowl pox, but the intensity and duration of the immunity does not measure up to that elicited by vaccine of chicken origin.

Laryngotracheitis

Laryngotracheitis, sometimes referred to as "flu", is a highly contagious respiratory disease of chickens which may also affect other species of fowl. It affects chickens of all ages, being particularly common to laying stock during the fall and winter months. Unfavorable weather conditions, dampness, and sudden temperature changes are conducive to outbreaks. The disease is common to all parts of the United States. It is one of the most

devastating diseases common to poultry in this country, causing enormous loss to hatcherymen, poultry dealers, and to the poultry industry in general.

Beaudette demonstrated that the infectious agent is a filtrable virus present in respiratory exudate; findings confirmed by research authorities in general.

Symptoms. The disease is characterized by its sudden onset, rapid spread, and devastating effect. The early symptoms are sneezing and coughing, lachrymation, difficult respiration, uneasiness, and a gurgling or wheezing noise incident to breathing. A thin, frothy eye and nasal discharge is observed which is periodically expelled by shaking the head. Respiratory movements are characterized by extension and retraction of the head and neck, accompanied by opening and closing of the mouth. As the disease progresses, the nasal discharge is tinged with blood and may show bloody caseous clots; the comb is cyanotic; the eyes partially or entirely closed; increasing weakness is observed; breathing becomes increasingly difficult, and death results from exhaustion and suffocation. The course will vary with the virulence of the virus and the susceptibility of the birds from a few days in the acute form to several weeks in the chronic. In the latter, the exudates may become caseous or membranous and extend to the sinuses of the head causing bulging of the infraorbital sinuses. The lesions are confined almost entirely to the respiratory tract. An attack confers lifetime immunity. If uncontrolled, the disease may persist for a month or more before all birds have recovered or died. The mortality rate will vary from 10 to 80 per cent. Egg production is severely affected. Even after all birds in a flock have apparently recovered carriers may serve as a source of infection to susceptible birds that are introduced.

Control. Since the disease occurs suddenly, unexpectedly, and spreads rapidly, isolation and sanitary measures as a rule afford little or no relief; however, as in other infectious diseases, these measures should be enforced whenever possible. The only effective control measure is vaccination. Laryngotracheitis vaccine de-

veloped by Beaudette is an effective prophylactic agent when properly used.

In vaccinating, the following precautions should be observed:

1. Use vaccine on healthy birds only—it has no curative merit.
2. Use only on premises or in localities where the infection is known to exist, vaccinating those flocks or units which are not already infected. Birds to be introduced into infected or vaccinated flocks should be vaccinated.
3. Vaccinate all birds on premises without delay. Never leave any birds in a vaccinated flock unvaccinated.
4. Examine all birds four or five days subsequent to vaccination to ascertain the percentage of "takes". At least 90 per cent "takes" should be obtained. All birds not showing "takes" should be revaccinated at time of examination; otherwise, they may remain susceptible and succumb to infection. The reaction consists of redness, swelling, and usually a white coating of mucus. Revaccination may be accomplished by using a bird that shows a satisfactory "take" as a source of virus—touch the brush to the site of the reaction and with the virus thus obtained inoculate nonreacting birds in the usual way.
5. Exercise care in handling the vaccine, remembering that it contains virulent virus and is capable of producing the typical disease if conveyed to the respiratory tract. After using, burn the container, brush, and unused contents.

The vaccine. The product is distributed in a package containing a vial of desiccated virus, another of diluent and brushes for vaccination. It should be kept under refrigeration and not mixed until the time of use. To prepare it for use, pour dried virus into the vial of diluent and shake vigorously for at least one minute, making certain that the product is uniformly suspended before using. Agitate occasionally while using.

Vaccination technic. Assistants should be provided to catch and, if possible, to hold the birds while being vaccinated. However, if the operator is seated, he can hold the birds between his legs, head down and legs to the right. By placing the thumb and index finger of the left hand on the lateral edges of the vent, the mucous membrane may be evaginated by drawing the finger and thumb backward, downward and apart. The manipulation should be such as to expose the mucous

membrane of the dorsal wall of the cloaca, the site of the inoculation. Holding the brush in the right hand, dip it in the vaccine and press against the side of the vial to remove excess. Apply vaccine to mucous membrane, keeping edges of bristles in contact with surface of mucous membrane. Sufficient pressure and strokes should be produced to result in a slight reddening of the membrane. Brush should be dipped into vaccine before each application. If brush becomes soiled, it may be cleaned by wiping with a cloth.

Treatment. No satisfactory internal medication has been found for sick birds; however, the use of a spray may be of some value. Likewise, the use of antiseptics and respiratory stimulants in the drinking water is helpful in many instances.

Recently a very severe bronchitis of virus origin has been brought to the attention of the profession, but the two viruses are immunologically distinct. In older birds, the infection is of a milder nature and extremely difficult to differentiate from the so-called mild form of laryngotracheitis.

Respiratory Disease of Chicks Bronchitis (Infectious)

A respiratory disease of chicks clinically similar to infectious laryngotracheitis, but due to a filtrable virus distinct from that of laryngotracheitis occurs more or less epidemic in brooder or battery chicks. The disease is readily transmitted by contact, exposure and the nasal secretions from affected birds which are very infectious. The virus does not live long outside the animal body and apparently is easily destroyed by water.

Symptoms. Judging from symptoms alone the disease might easily be mistaken for typical laryngotracheitis of older fowls. The disease is primarily a respiratory disease; therefore, the most prominent symptoms are naturally a manifestation of a physiological disturbance of the respiratory apparatus. The disease is frequently referred to as "gasping disease" by laymen.

Symptoms may occur as early as two days after the chicks are hatched, and the chicks show evidence of listlessness and

depression. This may appear only periodic and at times they liven up and eat and drink as normal chicks. Typical gasping may be observed at the onset, but most usually between the fifth and ninth days; and this appears to be the age when most chicks contract the disease. The severity is lessened in older chicks and symptoms are very rarely noted after fifteen days. Gentle rales, rattling and wheezy breathing is observed; and, when a chick is held close to the ear, any variety of respiratory sound can be heard. Discharge of a thin watery nature is frequently observed from the eyes and nostrils and sneezing is frequently observed. Coryza is sometimes present. The feathers become coarse and rough; the birds grow progressively weaker, huddling near the hover with eyes closed and apparently asleep, only to awaken periodically, thrusting their heads forward and upward and gasping for breath. Chicks die from asphyxiation or complete exhaustion.

Lesions. The most constant lesions are congestion with excessive mucus in the trachea and bronchi, especially at the bifurcation of the bronchi. The bronchi and bronchioles are filled with fluid. The lungs are generally congested and edematous, and thin watery fluid is easily squeezed from the lungs. In many cases, the only lesion is an inflammation of the bronchi at the bifurcation. This inflammation may be so slight as to be determined only by histopathologic examination. In some cases, the nasal passages and sinuses become coated with a mucopurulent exudate, which is observed if the head is cut in cross section just anterior to the eyes, and pressure is exerted in this region.

Treatment and preventive measures. The disease is very acute and rapid in its course, so that any treatment must be preventive. Many types of mist or fine powder sprays have been used, but it is rather doubtful if beneficial effects, of permanent value, are noted. The most important measures are to see that absolute sanitation and hygienic measures are carried out. The brooder room and house should be carefully washed, using plenty of water. Paper may be used on the floor and

burned daily; temperature should be kept normal at all times. In severe outbreaks the plant should be closed and no chicks allowed in it for five or six weeks.

HYGIENE *(Continued from page 22)*

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Dr. Packer, a native Iowan, received his B. S. in Animal Husbandry and his D. V. M. from Iowa State College in 1940. After his graduation, he became an assistant in the Department of Veterinary Hygiene.

Dr. Packer is an instructor in veterinary bacteriology, milk hygiene, and mastitis control. He also teaches a course in farm sanitation offered for students in Animal Husbandry. In addition, Dr. Packer is pursuing graduate study in veterinary bacteriology. His special problem is the study of streptococci, with particular emphasis on the use of selective media in that study.

Dr. Packer is a member of the American Veterinary Medical Association.

Sam G. Kenzy, B. S.



Mr. Kenzy was born in South Dakota. He received his B. S. from South Dakota State College in 1934, with a major in mathematics and a minor in chemistry. The following year he accepted a position as a high school instructor

and for three years taught mathematics and biology. In 1937, he became a graduate assistant in bacteriology at South Dakota State College. He accepted a similar position in the Department of Veterinary Hygiene at Iowa State College in 1938.

He is graduate assistant in bacteriology in milk hygiene. In addition to this, he is