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THE cause of disease in poultry may generally be traced to unsanitary conditions. Especially true is this of fowls in confinement, and the specific cause of disease gains access to the body through contaminated food and drink.

It is a well established fact that when an organism causes disease in an animal body, it leaves the body again in a more virulent form than when it enters, or plainly speaking, its disease producing power has been increased.

A fowl having a germ disease, discharges with its excreta countless numbers of germs of a virulent form long before pronounced symptoms of the disease are manifest. When food is thrown upon the ground, it is sure to become contaminated with the excreta and the germs thus directly transplanted into healthy fowls. When an outbreak of disease occurs among fowls, often its origin may be traced back to one diseased bird which had died, or had been otherwise disposed of months before. If the disease is tuberculosis, an incubating period of considerable time must elapse between the time the organisms enter the body until the first noticeable symptoms appear. This is true of all bacterial diseases, although the incubating period varies according to the disease, tuberculosis being the slowest in its action.

**Tuberculosis.**—The most destructive disease we have among fowls, especially grown chickens, is tuberculosis, and it is the most difficult to detect from symptoms because the disease occurs in many forms in various parts of the body, and progresses so slowly that any peculiar behavior of the fowls is not noticed until the disease is well advanced.

**Cause.**—Tuberculosis in fowls is caused by micro-organisms known as the tubercle bacilli. These germs are microscopic plants measuring on an average 3 / 25000 of an inch in length, and are there-

fore so minute that they cannot be detected without the aid of a microscope of high power. They are not known to produce seeds or spores, but the germ itself is very resistant to the elements, retaining its vitality for a long period of time.

**Distribution.**—Owing to their minuteness, it may be readily understood how easily countless numbers of germs may be carried from place to place by means unthought of. If fowls alone were affected with tuberculosis, it could be easily controlled, but unfortunately the disease affects human beings, cattle and swine as well. The association of these susceptible bodies maintains the prevalence of the disease. We have had several positive cases of the infection being transmitted by sputa from consumptive poultrymen to fowls under their care, and we have found more tuberculosis among barnyard fowls, than among all others combined. Cows having pulmonary tuberculosis swallow that which is coughed up from the lungs containing the bacilli, and they pass through the animal alive with the excreta; thus in eating the undigested grain in the manure, the fowls become infected, notwithstanding the mooted question of the transmissibility of the organisms from mammals to fowls; for there is but one tubercle bacilli, and all the variations have come through their environment in the host that nourished them. Whether all the different types originally came from a human, bovine or avian source is not known, and never will be, but the transmissibility of any of these three forms is possible in either direction. The poultryman is admonished never to cough and expectorate where his fowls may pick it up, and to keep his fowls from feeding upon manure piles. Aside from the danger of tuberculosis, fowls fed with manure cannot produce as choice flesh or eggs as when they are fed clean food.

**Symptoms.**—When the disease is situated in the viscera, the first symptom that we have noticed is lameness, but this is an uncertain indication of tuberculosis, as it may be confounded with rheumatism or with an injury. There are no other pronounced symptoms except mopiness, abnormal appetite, ruffled feathers, drooping tail and colorless comb and wattles. When it is external there are visible growths on the wings, head, or on the legs at the joints. The growth may be of a warty nature, or may be suppurating swellings.

**Seat of Disease.**—As the organisims enter the body with food, the disease is more commonly found in the digestive tract and the liver than in any other part of the anatomy. Many cases of the disease

in its advanced forms fail to show any lesions of the lungs. There are two common forms that are easily detected; one is a fibroid growth on the intestines varying in size from a pinhead to a lump as large as a walnut. In cutting through these tubercles, they will be found to contain a substance varying from a serous fluid to a rather dry, cheesy mass according to their size and age. It frequently happens that when a tubercle on the intestine becomes the size of a large pea, the mucous membrane and wall of the intestine on the inner side of the tubercle breaks down and discharges the contents of the tubercle into the fæcal matter that is passing through the intestine, thus carrying out with the excreta a great number of living tubercle bacilli.

The liver is the other organ commonly affected. When the tubercle bacillus finds its way into the liver and begins to grow, a yellowish spot is soon formed; increasing in size as the disease progresses. The structure of the tissue at this point is changed to a hard granular mass containing within it the bacilli and the same substance as found in the intestinal tubercle. The growth of the tubercles necessarily increases the size of the liver until it sometimes becomes twice its normal size, and the tubercles are frequently so numerous as to give the liver the appearance of peanut taffy.

There are other spots of similar appearance sometimes found on the liver that must not be mistaken for tubercles. A crude way of distinguishing tubercular lesions is by the fibroid tissue of a tubercle being tougher and harder than the structure of the other spots mentioned, and by the center being filled with a substance as before described. Sometimes the disease is scattered all through the internal organs and tubercles may be found even on the heart.

A chicken thus infected does not live long and becomes very much emaciated before death.

**Treatment.**—I wish that it were within my power to recommend some efficient remedy, but there is nothing known better than to effect a remedy by prevention. The open air treatment, and feeding heavily with nitrogenous foods, do not seem to be of any benefit and the administration of drugs fails to penetrate the tubercles and reach the bacilli in a strength sufficient to kill them without being a serious injury to the host. We must, therefore, depend upon proper sanitation and the use of disinfectants.

When a run or yard is supposed to be infected, a good application of quicklime is perhaps the most effective in destroying the

bacilli, and is more easily applied than other disinfectants. Take fresh lime, place it in a box and sprinkle sufficient water upon it to break it into a flowery powder to be scatttred over the ground, coops, floors and dropping boards, until they are thoroughly whitened. If the earth is raked over lightly so as to mix in the lime, it will prevent the burning of the chicken's feet. Coops, water fountains, and feeding troughs, may be sprayed or washed with a solution of formaldehyde, one pint to twenty gallons of water. These disinfectants are equally good in case of any other bacterial disease.

**Roup.**—The diseases coming under this head are subject to subdivision, for roup proper is a contagious bacterial disease, while catarrh, producing nearly the same symptoms, may be induced in individuals through draughty coops and is not contagious. Notwithstanding the fact that several birds may be subjected to the same exciting conditions and manifest the same symptoms, it does not follow that one bird has caught the disease from the other by infection. It is not usual that a poultryman can distinguish the difference between true roup and a catarrhal cold, for the one, being a bacterial disease, is caused by micro-organisms, while the other is a systemic disturbance caused by climatic conditions and environments.

Chickens are quite susceptible to taking cold, especially when kept in confinement. If left to run at large they may sleep in a tree or on a fence in our worst winter storms and keep well, but they cannot sleep in a draughty coop with their feet and legs plastered with mud, without taking cold, When a chicken takes a severe cold it becomes much more susceptible to any bacterial disease that may be about, for a cold is the fore-runner of most diseases of the respiratory tract. A congested and inflamed condition of the lungs causes an exuding of serum which becomes a culture medium for many of the parasitic micro-organisms that could not grow under normal conditions, although they are present.

**Cause of Roup.**—It is a well recognized fact that roup is a highly infectous disease, although the specific organism causing it has not been satisfactorily established.

**Symptoms.**—Roup is primarily a communicable disease of the mucous membranes of the head, the eyes and nostrils suffer most severely. The disease begins with an apparent cold with a watery discharge from the eyes and nostrils. As it progresses, the mucous

membranes become inflamed and the watery discharge becomes thicker, more viscid and of the consistency of pus. The head becomes a darker red with eyes protruding. The nostrils become filled with the discharge, making breathing difficult, and there is an offensive odor about the head.

The birds become mopish with ruffled feathers, and gasp and sneeze. The infection in severe cases spreads from the nostrils to the throat, where the mucous matter accumulates, causing distressed breathing and death.

**Treatment.**—In the early stages of the disease we have met with good success by dipping the bird's head into a two per cent solution of permanganate of potash. This must be done before the nostrils have been closed with the discharge, or the solution cannot enter and act as a disinfectant. The head must be held in the solution as long as possible without strangling the bird, or until upon removing the head, the bird sneezes, thereby forcing the solution into the deeper air passages. One application will not suffice, but must be continued several times daily until a cure is effected. In severe cases it frequently happens that tumors are formed on the side of the head, usually near the eyes; they may be opened with a clean sharp pen knife, the pus discharged from them and the sac washed out with a weak solution of peroxide of hydrogen, or some of the permanganate solution.

We have had reports from practical poultrymen, and have verified it ourselves, that applying coal oil to the affected parts in the early stages of the disease is very excellent A good wing feather, stripped so as to leave a tuft at the end, is very good to apply the remedy with because it may be passed over the mucous membrances of the eyes, into the nostrils and in the cleft of the roof of the mouth, reaching the lower part of the nostrils. Coal oil has a tendency to creep where a watery solution would not reach. As this is a rapidly spreading disease, the first bird showing symptoms of it should be removed at once, and quicklime or some other disinfectant used, because it is difficult to eradicate after the premises once become infested. The same treatment may be applied in cases of catarrh, or severe colds.

**Diphtheria.**—Occasionally an outbreak of diphtheria occurs among fowls, and to distinguish it from roup, the bird must be caught and examined, for the symptoms are similar to roup. If it is diphtheria, upon opening the mouth a false membrane will be found on the

tongue and roof of the mouth extending well down towards the larynx. The membrane is first found to be soft and white, gradually becoming dry at the edges, thickened and yellowish to light brown in color as the disease progresses. It is firmly attached to the flesh and cannot be removed without injury to the parts affected. Great care should be exercised in handling birds having diphtheria, as the disease is transmissible to human beings.

Considering the ineffectiveness of treating fowls having diphtheria, it is advisable to kill and burn the first bird that is known to have the disease.

**Scabies, or Scaly Legs.**—Scabies is caused by the presence of a mite known as *Sarcoptes Mutans*, which penetrates beneath the scales on the legs. By burrowing, these mites set up an irritation which leads to a multiplication of the cells of the part and an exudation of serum. It is by the union of these two conditions that the crusts are formed, which raise the scales from their normal condition. If the crusts are removed and the under surfaces examined with a magnifying glass, they are found to contain a large number of pits and depressions, in each of which a female egg containing sarcopt, is lodged. The larvae, males, and younger females are found wandering beneath the crust which contains so many cavities that it resembles dried bread. As the crust thickens by deposits on the inner surface, the cavities first formed become smaller by the drying of the walls surrounding them, and the mites abandon this location for a position nearer the flesh, where there is more moisture and food. The mites are therefore principally found on the inner surface of the crust, although the cavities, causing a honey-combed appearance, exist throughout the whole substance. The treatment, briefly stated, is to remove the affected birds to prevent the spread of the mites. The houses they occupy should be thoroughly cleaned, the roosts and other woodwork should be scalded with boiling water, and everything whitewashed. The treatment of the afflicted birds is to remove the loosened scales in order to bring the remedy in contact with the mites. To accomplish this, the legs should be soaked for a sufficient time in warm water to which some soap and a small amount of coal oil has been added. When thoroughly softened, the loose scales may be removed withou causthe legs to bleed. After this has been done, the legs are dried and treated with a good coat of ointment made with balsam of Peru, one or two drachms to one ounce of vaseline. The disease is not a

difficult one to cure if the preliminary treatment is thorough and the crusts all removed.

There are cases of tuberculosis, however, which affect the birds' legs by forming an external growth which very much resembles scaly legs, but by treating as above described, the disease may readily be differentiated. The crusts in scaly legs are easily removed, while in tuberculosis it is impossible to remove the enlargements.

**Apoplexy.**—In warm moist climates like western Oregon, chickens should not be fed too much wheat or other fattening grains as there is danger of their becoming over fat. We have dissected a great many hens (especially of the Barred Plymouth Rock breed) which had died from the effect of excessive fatness causing apoplexy. Death occurs suddenly without previous symptoms. Usually the bird is found dead under the perch from which it had fallen during the night. Upon dissecting it, thick pads of fat are found in the abdominal cavity and around the viscera, even the heart is padded with fat. If the hen is about to lay, the increasing size of the eggs also helps to fill the abdominal cavity to such an extent as to interfere with heart action, and the bird dies from a rupture of a small blood vessel in the brain. After death, the comb, wattles, and unfeathered parts of the head are dark red.

It is a cruelty to fowls to confine them to small runs absolutely devoid of green food. They naturally live upon grass, insects and worms, when allowed to run at large, and it requires but little grain to keep them in a healthy, vigorous condition. A cabbage costing five cents is worth fifty cents to five chickens in keeping their bowels in a healthy condition. A lawn mower carrier full of grass seldom costs more than the effort to procure it, and it is a splendid tonic to chickens in confinement, besides reducing the required amount of more expensive food.

The hen should be kept in a healthy and normal condition, for when the energy of the body is called upon to overcome some injury or disease, the formation of eggs is retarded, if not entirely suspended.