AVIAN LEUKOSIS
a complex problem

Chicken with paralysis of legs from leukosis

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LEUKOSIS, or more properly, the avian leukosis complex, causes serious economic losses to the poultry industry. While primarily a disease of older birds, in recent years it has affected birds as young as two months and has led to an alarmingly high percentage of condemnations of broilers in the dressing plant. Leukosis is chiefly a disease of chickens, although turkeys, guinea fowl, pigeons, pheasants and ducks occasionally develop the disease. Wild birds such as the starling and the sparrow have been found to harbor the disease. It is hoped that in the next few years a simple, inexpensive means of lessening the economic losses from leukosis will be found.

Fowl leukosis is a complex disease occurring worldwide, caused by an unknown number of viruses. The annual cost in the United States is estimated to be in excess of 150 million dollars. Fowl leukosis causes heavier losses than any other poultry disease in North Dakota. It is estimated that the leukosis complex is the cause of greater financial loss than all other chicken diseases combined.

Forms of this tumor-forming disease and the organs affected are:

Marek's Disease
- Visceral Form
- Nerve Form (Fowl paralysis)
- Ocular Form (Pearly eye)
- Acute Leukosis
- Skin Form
- Ovarian Form

Leukosis/sarcoma group (Cancer-like)
- Lymphoid Leukosis
  - Visceral Lymphomatosis (Big Liver Disease)
  - Blood forms
    - Leukosis
    - Erythroid Leukosis
    - Myeloid Leukosis
- Kidney (Nephroblastoma)
- Bone (Osteosarcoma)

The viruses of Marek's Diseases are readily transmitted through the air and are very infectious. Little or no resistance is produced by these viruses in the chicken.

The viruses of the leukosis/sarcoma group are transmitted through the egg and slowly by bird to bird contact. Only a moderate resistance is produced by the infected chicken.

In both types, the very young birds are the most susceptible. The type and number of the virus as well as the age and susceptibility of the chickens are important in producing the infection. The amount of infection a bird is exposed to is also important in causing the disease. Sick birds shed a large number of viruses so it is important to cull and burn them immediately after they are detected. Infected birds that survive are carriers and shed the virus throughout their lives.

The visceral form of Marek's Disease and Lymphoid Leukosis (Big Liver Disease) affects the digestive
system of the bird so that there is a severe diarrhea, pale comb, weakness and severe loss of weight. The liver, spleen, ovary and kidneys are most often affected.

The tumorous growths in the liver, kidney, spleen and ovaries enlarge these organs several times their normal size. They can vary from a mahogany to a grayish-mottled color with smooth to rough nodular formations.

Liver of chicken with nodular lesions of leukosis.

Fowl paralysis is most often found in birds under six months of age, but occasional losses occur in older birds. Progressive paralysis occurs in the legs, wings and sometimes the neck. The condition may begin with incoordination or weakness. The lameness becomes progressively worse until the birds are unable to stand. They assume a position of resting on the breast, with one leg extended backward and the other forward. The neck may be drawn to the side, downward or upward. In some cases, the birds may have an unsteady gait. Death may occur in a few days or after several weeks, usually as a result of starvation. Occasionally both the neural and visceral symptoms are found in the same birds.

In the ocular type, the color of the iris of the eye fades, giving the eye a gray, glassy appearance. In the advanced stage, the pupils become small and irregular in outline, and the eyeballs may bulge. Eventually the birds become partially or completely blind. "Gray Eye" is usually a good indication that other forms of the leukosis complex may be present in the flock.

Eye affected by leukosis.

<table>
<thead>
<tr>
<th>MAREK'S DISEASE</th>
<th>FORM</th>
<th>TYPE</th>
<th>ORGAN AFFECTED</th>
<th>SYMPTOMS</th>
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</thead>
<tbody>
<tr>
<td>Visceral</td>
<td>Big Liver Disease-like</td>
<td>liver, spleen, ovary &amp; kidney</td>
<td>severe diarrhea; pale comb</td>
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<tr>
<td>Nerve</td>
<td>Fowl paralysis</td>
<td>legs, wings, and neck</td>
<td>weakness; lameness</td>
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<tr>
<td>Ocular</td>
<td>Pearly eye</td>
<td>Iris and pupil of eyes</td>
<td>eye color fades; small pupils</td>
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<tr>
<td>Ovarian</td>
<td>Tumorous growths</td>
<td>Ovaries</td>
<td>enlarged organs</td>
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<table>
<thead>
<tr>
<th>LEUKOSIS/SARCOMA (Cancer-like)</th>
<th>Lymphoid leukemia</th>
<th>Blood form</th>
<th>Visceral</th>
<th>weight loss</th>
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</thead>
<tbody>
<tr>
<td>Visceral lymphomatosis</td>
<td>Big Liver Disease</td>
<td>Ovaries, liver, spleen, kidney</td>
<td>severe; weight loss</td>
<td></td>
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<tr>
<td>Blood</td>
<td>Leukosis</td>
<td>Ovaries, liver, spleen, kidney</td>
<td>weight loss</td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>Erythroid leukemia</td>
<td>Blood forming organs</td>
<td>severe; weight loss</td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>Myeloid leukemia</td>
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<tr>
<td>Kidney</td>
<td>Nephroblastoma</td>
<td>Kidney</td>
<td>lameness</td>
<td></td>
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<tr>
<td>Bone</td>
<td>Osteopetrosis</td>
<td>Bone</td>
<td>leg bones enlarged</td>
<td></td>
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</tbody>
</table>

FOWL LEUKOSIS
A bird with the bone form (Osteopetrosis) is lame and shows an increase in the size of the bones of the legs. The bones are seen to be thickened, hardened and misshapen.

With available information, it is difficult, if not impossible, to place responsibility for the spread of fowl leukosis. Assuming breeder and hatcheryman employ the currently accepted sanitary and disease control procedure, the breeder and hatcheryman cannot be held responsible.

There is no vaccination or medication today that will effectively prevent or treat this disease.

**Sanitation Practices That May Help:**

Since no known medication will prevent or treat leukosis infection, a program of proper management and super sanitation is the only method of controlling the disease on the farm.

Clean the brooder house thoroughly before the chicks come. Disinfect the floors and walls of the brooder house. Wash and disinfect all equipment. Use lye water or any standard disinfectant. Follow instructions for use, given on the label. Use the disinfectant liberally. Keep a pan of disinfectant outside the door of the brooder house; disinfect the shoes of anyone who enters the house.

Do not mix two or more age groups in the brooder house. Keep the young birds separate from the old flock. Do not allow the young and the old to range together. Some authorities recommend an all-out, all-in program where the old birds are removed from the premises before the young are brought home. This is not too difficult if started, ready to lay pullets are purchased as replacement stock.

Chore chicks in brooder house before taking care of the laying flock. This will help prevent transferring leukosis and other diseases from the old flock to the new.

Because the viruses of leukosis are present in the droppings, remove and spread chicken litter in an area away from the homestead out of reach of young birds.

Certain beetles that grow and multiply in chicken litter are known to harbor the viruses of leukosis. Spreading the litter on the fields away from the farm site will help prevent the beetles from returning to the house and infecting the new flock.

Fumigation of the brooder house and laying house is recommended. Fumigation should be done immediately after the house has been thoroughly cleaned, using a combination of 40% formalin (formaldehyde) and potassium permanganate crystals. A recommended formula is 1½ quarts of 40% formalin and 1½ pounds of potassium permanganate crystals per 1,000 cubic feet of house. Use crockery or metal containers, as considerable heat is produced by the chemical reaction. Safety note: The chemical reaction caused by formalin and potassium permanganate releases pungent and dangerous fumes. Lock the door of the house immediately after placing the chemicals, keep it locked for 24 hours, then allow air to circulate through the house.

There are several brand name fumigants, in powder and candle form, that are very effective and easy to use. Ask your serviceman or hatcheryman about them.

**Management Practices That Help Control Leukosis:**

- Keep friends and neighbors away from your poultry, and, on the other hand, avoid the neighbor's poultry house.
- Cull all birds showing signs of disease. In most cases, they will not recover, and if they do recover, they may be carriers of various diseases, including leukosis.
- Provide plenty of brooder space - ½ sq. ft. to six weeks and 1 sq. ft. to range age.
- Feed an adequate ration fully fortified as to protein, minerals and vitamins.
- Rid the premises of rats and mice. Rodents carry many diseases either as physiological vectors or as mechanical carriers.
- Practice a program of house, mite and beetle control. Ask your county extension agent for the latest recommendations on insecticides and methods of external parasite control.
- Keep cats, dogs, pigeons and wild birds (sparrows and starlings) out of the poultry house.
Chicken with large shank bones from osteopetrotic leukemia.