



Avian Spirochetosis and Streptococcosis outbreak investigation

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Abstract: Avian Spirochetosis and streptococcosis were confirmed in small enterprise poultry farms in Bichena town, North West Ethiopia in 2019; however description of clinical or pathological signs was not carried out by both livestock keepers and field-based animal health workers before. A study was therefore conducted to investigate and describe clinical signs and pathological lesions associated with suspected spirochetosis and streptococcosis cases in Bichena. It involved history taking, clinical examination, necropsy and bacteriological examinations. Necropsy examination of 3 avian was performed. Slice of liver, spleen, kidney, lung, heart and heart blood and moreover, hemorrhagic intestine, intestinal ingesta and cecal core were collected and sent to Bahir Dar regional veterinary laboratory under preservation in sterile phosphate saline with and without 50% glycerol, and 10% formalin as required and necessary. Epidemiologically, the population at risk was 1150, with 651 and 630 sick and dead chickens and morbidity, mortality and case fatality rates of 56.61%, 54.78% and 96.77% respectively. This figure implies that almost all sick chickens had already died as a direct result of the outbreak.

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Background

It was difficult to find articles about avian spirochetosis that has been studied in Ethiopian poultry farms which made us complex for the identification of the problem under study. There has been no description of clinical or pathological manifestation of the disease which is important in guiding livestock keepers and field-based animal health workers to identify and diagnose spirochetosis cases. Clinical signs of the spirochetes are highly variable and generally non specific (Michael, 2019). When a new disease is introduced in an area, it is likely to be confused with other diseases and also lack of laboratory facilities necessitates use of clinical signs for field-based diagnosis. Clear picture on signs and lesions (standard case definition) that could be used to identify a disease are important during disease investigation, disease surveillance and control (Raquel, 2009).

This study was done to describe clinical manifestations and pathological lesions associated with clinical cases as well as confirmation of avian spirochetosis and streptococcosis by necropsy finding and bacteriological culture. Findings would help disease control measures and to reduce the disease impacts.

Literature summary

Spirochetosis is a bacterial disease caused by *Borrelia anserina* and transmitted by tick and other biting flies. Argas ticks are biological vector of the disease which is notable for their long life span, ability to survive for extended periods without a blood meal, efficacy in transmitting spirochetes and the ability to remain securely hidden in cracks and crevices often beyond the effective reach of pesticides. Accordingly, tick control is difficult (Merck, 1986; Cooper, 1993).

On the other hand, various streptococcal species cause disease in poultry. Streptococci are ubiquitous in the environment, intestinal microflora and are considered opportunistic. As streptococci are part of normal flora, infection is often thought to occur secondarily to other disease (Merck, 1998) and hence concurrent occurrence with spirochetosis was the problem occurred in this poultry farm. Streptococcal infection is transmitted via oral or aerosol route. Among other things, many times in streptococcal infection dead birds are the only finding. There are two forms of the disease, an acute septicemic form and a chronic form. Flock mortality can be as high as 50%. Penicillin and oxytetracycline are effective during the acute phase of this disease and efficacy decrease as disease become chronic. Prevention and control requires reducing stress and preventing

immunosuppressive diseases and conditions. Proper cleaning and disinfection can reduce resident streptococci flora to minimize environmental exposure (Teresa, 2019).

Study Description

The study was done in Bichena town poultry enterprise, East Gojjam of Amhara region, North West Ethiopia (Latitude 10°27' N and Longitude 38°12'E and altitude 2535 m a.s.l.). Mean total rainfall (1205 mm), average annual temperature (15.9°C) and relative humidity (69%). Bichena town has human population of 16,411 and an estimated number of 6000 to 8000 poultry. This area borders Dejen district which border Oromia region of the country.

Poultry farm owners participated in this study was purposively selected based on the presence of active suspected spirochetosis and streptococcosis cases in their flocks. Flock was first visually inspected at a distance and environment was examined. Basic information was collected by structured and semi-structured questionnaire which were both open-ended and close-ended and was introduced to the respondents as necessary and required. Furthermore, trial has been made to differentiate similar diseases on clinical grounds.

Epidemiologically, the population at risk was 1150, with 651 and 630 sick and dead chickens respectively. This figure gives us a resultant morbidity, mortality and case fatality rates of 56.61%, 54.78% and 96.77% respectively. This figure implies that almost all sick chickens had already died as a direct result of the OB.

Anamnetically, the owners said that there was a sudden death without premonitory signs. But clinically at a close observation, the sick chickens have manifested listlessness, somnolence, depression, unkempt feather, dropping wings, and yellow (sulfur colored) fecal pasting. However, the sick chickens responded quickly to a noise stimuli.

Looking into the treatments used to control the disease under question, a multitude of medicines were used. Among which, tetracycline water preparation for three days (08/02/12 to 11/02/12 inclusive), oxytetracycline LA 20% by wing injection for a day, (on 14/02/12) for 6 chickens but died soon after injection. Moreover, ciprofloxacin 500mg in water for a day (20/02/12) but there was no response. These above treatment regimens were to treat the disease of concern of bacterial origin. Unfortunately, none of our attempts were successful. On the other hand, amprolium 20% was given for three days (12/02/12 to 14/02/12 inclusive), if the disease was of coccidial infection, but there was no response as well. Moreover, the chickens were given fenbendazole water preparation for a day and vita-chicks for three days

(15/02/12 to 18/02/12) to treat GIT helminthiasis and nutritional deficiencies respectively but the trails were at vain.

We have never ever experienced such a complex and complicated OB in our life time. This is due to the fact that the symptoms and postmortem changes observed were very mimic and similar to each other. As a result, we suspected a multitude of hemoparasite and bacterial disease; among which, a toxoplasmosis, leukocytozoonosis and histomoniasis of protozoan origin. As the result, chloroquine and metronidazole was given to a controlled group of sick chickens, but the response was grave. On the other hand spirochetosis, streptococcosis, chlamidiosis and fowl typhoid of bacterial diseases were also suspected as a falling man catches a straw. For this effect, penstrep and gentamycin were prescribed by intramuscular injections for a certain sick chickens. Unfortunately, the responses were not well noted because of various type treatments and were also for a shorter duration as the owner was hopeless.

We had a chance to perform three postmortem examination, two sick and one normal chickens. The latter chicken was used for comparison purpose. The major postmortem changes observed were hepatomegally and splenomegally, which were both two to three times swollen than the normal size. The other postmortem changes observed were also cardiomegally, swollen kidney, and severe hemorrhagic enteritis particularly at duodenum and fecal cores at cecum.

In order to confirm the disease under question various but appropriate specimens were collected and sent to Bahir Dar regional laboratory. These were pooled specimens of slice of liver, spleen, kidney, lung, heart and heart blood. Moreover, hemorrhagic intestine, intestinal ingesta and cecal core were also collected. These specimens were preserved in sterile phosphate saline with and without 50% glycerol, and 10% formalin as required and necessary.

After these all up and downs, and concerned untiresome and multicolous efforts and bacteriological examinations at Bahir Dar regional laboratory has disclosed or confirmed to spirochetosis complicated by streptococcosis.

Research application

Clinical presentation, histopathological feature and bacteriological examinations suggest that the disease outbreak in Bichena poultry farm, North West Ethiopia was due to spirochetosis and streptococcosis. There was another poultry farm within 7 to 10m distance from this farm which remained unaffected by the current OB. The two poultry farms which exist within a campus had the same breed of poultry, the same feed and water sources. The only epidemiological

determinants that differentiate the two farms were the source and type of sands used in the play grounds of the chickens. The unaffected farm sand used was red sand and originated from the blue Nile basin on the other hand, the affected poultry farms used black sand and originated from a local river called ‘soha’. We highly suspected that this black sand of the vicinity might harbor the earthworms and droppings of the wild birds deposited in the affected farm might be the source of this OB.

Spirochetosis is a relatively new disease in the study area hence the study results will be used to create Spirochetosis awareness to different stakeholders including livestock keepers, field officers and veterinarians, local, national and regional governmental authorities. The findings will be used to: i) develop information dissemination materials and programs including brochures, posters, booklets, newspapers and disease diagnostic manual. ii) Strengthen veterinary services like disease diagnosis and surveillance.

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