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Serological Survey of Broiler Flocks with High Mortality in Southern Iran

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ABSTRACT

Currently, the poultry industry has an important position in producing protein products. On the other hand, it is necessary to identify diseases specific to a region that lead to poultry loss in that region. We aimed to assess the serology of broiler flocks with high mortality rates in southern Iran during 2014-2015. After the referral of 40 insured poultry owners experiencing high mortality rates, serum samples were obtained in two stages with 2-week intervals. 3200 serum samples were collected from broiler farms in southern Iran during a 2-year period and transferred gradually to the laboratory. Influenza, bronchitis, and Newcastle viruses were the most important causes of infection and the mean amount of mortalities was 25%. Also, influenza was the most important factor leading to mortality in the region. On the other hand, the low virulence influenza strain and the bronchitis virus were accompanied by secondary infection and mycoplasma. In southern Iran, the organisms causing the highest rate of infection were the influenza and bronchitis viruses.

Keywords: Insurance, Influenza, Bronchitis, Serology, Mycoplasma

INTRODUCTION

In recent years, increased poultry production in the least amount of time and with the least expenses has led to the use of biological additives. Health is the important and determining factor in the function, uniformity, and sustainability of flocks in face of diseases. A strong immune system increases the body's resistance against disease (3, 14,15).

Various metabolic reactions caused by oxidative stress and damage, have a destructive effect on resistance against disease. Various conditions, especially viral infections such as influenza, bronchitis, Newcastle, reovirus, anemia virus and mycotoxins can weaken the immune system and increase mortality rates (2, 5,6,11).

Although the establishment of avian insurance companies has compensated and reduced financial damages imposed on production units, identifying disease-creating factors is still very important and can determine which measures should be taken for control and prevention. Therefore, we aimed to assess the factors creating disease in broiler flocks and the disease prevalence in flocks with high mortality rates referring to avian insurance office in southern Iran during 2014-2015 using serological methods.

MATERIALS AND METHODS

In this study, we referred to broiler farms that had referred to the poultry insurance companies because of abnormal mortality rates. Serum samples were randomly obtained from 10 broilers at baseline and after separating the serum, the samples were transferred to the laboratory. The enzyme-linked immunosorbent assay (ELISA) was used to detect infectious bronchitis and hemagglutination inhibition test was used to detect influenza and Newcastle infection. Moreover, rapid hemagglutination test was used for mycoplasma gallisepticum on slides using the antigens from Razi Serum and Vaccine Institute based on the manufacturer's instructions (10).

After two weeks from the occurrence of disease, we referred to these poultry centers and serum samples were obtained from 10 broilers for each flock and transferred to the laboratory to assess serum antibody changes.

Clinical symptoms, postmortem findings, mortality rate, age of involvement, duration of illness, vaccination program were assessed at each stage. In general from the 40 referred poultry industries serum samples were obtained twice from 20 broilers with a two-week interval to assess the antibody titer. In other words, for each pathogen, 800 samples were obtained adding up to 3200 serum samples.

RESULTS

Of the 21 active poultry industries in this region, three units had a capacity of 45000-100000.

Flocks, 15 had a capacity of 20000-30000 flocks, and 5 had a capacity of 10000 flocks. The units used a tunnel system for air conditioning using novel automatic air conditioning and heating facilities. Although a humidifier system was designed and installed in some poultry farms, their use is limited. The most frequent reported disease was bronchitis infection and mycoplasmosis. The frequency of mycoplasmosis was more than 80% in this period. The rates of mortalities during the three sampling periods during the study period were 21.46%, 37.83%, and 20.3%, respectively.

The least rate of mortality during the study was 9% and the highest 85-88%. Mortality rates of over 50% during this period comprised 11.4%, 39.1%, and 11.1% of the flocks, respectively.

In the first sampling phase 70% of the flocks were afflicted at the age of three weeks and 22.5% at the age of four weeks; while in the second phase 44% of the flocks were afflicted at the age of four weeks and 28% at the age of five weeks. In the third phase of the study the age trend of disease was equal during different weeks of development. For determining the range of antigen titers in unvaccinated flocks, we considered a positive test results and an increasing elevation of titers. Sudden and increasing titers in vaccinated flocks were considered as disease positive based on symptoms, the vaccination program and the time of its implication.

DISCUSSION

The importance of health maintenance and identifying regional risk factors is evident for better output and lowering production costs. Although, the gold standard of identifying the source of infection is culture, it is very expensive and requires a professional team because of the possibility of infection by multiple sources. Therefore, detecting diseases using serology techniques could save time and expenses. It can also provide valuable information on the type of infecting agent and assist in our evaluation of the method of infection control (4,13).

We found an increasing trend of mortalities in the studied units with a mean increase of 25%. 21.1% of mortalities of over 50% were found in units with a capacity of more than 45000 flocks. The corresponding figure for units with 20000-30000 flocks was equal to 57.9%, and 21.1% in those with a capacity of 10000 flocks. Although, normal mortality rates of 4% have been reported for broiler flock industries, some studies have reported rates as high as 10% for disease prevalence (1).

In Iran, some studies have reported mortality rates of 20-65% during 1998-2001 (8,9); while in another study this rate was reported to be 20-30% of which 53.3% of infections were caused by low virulence influenza and 40% by bronchitis virus (11). During 2004-2005, the mean mortality rate of broiler flocks in Iran was reported to be 7.89%

on a national level. However, the low virulence influenza-induced mortality rate was 26.1% and that of infectious bronchitis was 22.1% (1). Karimi and colleagues reported a mean mortality rate of 13.52% during 2001-2006 (5).

In the first phase of our study, most mortality was seen in the 20-25 day age range. This condition shifted towards the second half of the developmental phase. Alterations in the age of first vaccination, especially oil-based influenza and Newcastle vaccines, have been effective and increased antibody production has led to increased age of affliction. In the third phase, the age of affliction was similar in all developmental phases. Irregular vaccination due to expenses and no faith in the effect of vaccines are among the contributory factors in this regard. Other studies have reported the age of affliction to be 3-6 weeks in cases with high mortality rates during 2004-2005 as well as 3-7 weeks (1,8,9).

The recovery phase was 2-3 weeks in the first and third sampling phases because of secondary infections and prolonged mycoplasmosis. However, in the second phase of sampling the recovery time was 1-2 weeks.

Although in most cases the prevalence of viral diseases is a function of its occurrence in another part of the country, drought conditions and increased dust and air particles are also influential. Most poultry units are designed in along windy routes and some are close to roads which facilitate the spread of disease. If one farm is afflicted, other farms along the road and wind will be at risk.

Although the severity of disease depends on the level of management and preventive measures applied in each farm. It should be noted that distance farms and those situated in densely vegetated areas experience less mortality rates. Densely populated farms and those near each other are at risk of higher mortality rates (12). The distribution of disease is also related to geographical conditions as well as different management systems of poultry units (1).

According to insurance companies and based on reports they obtain from farm managers or vets, most mortality rates were due to infectious bronchitis and mycoplasmosis, so that from the 103 cases reported, 13.6% were related to infectious bronchitis and 86.4% to mycoplasmosis. In general, based on laboratory results, nine (22.5%) farms had reported mycoplasmosis, 24 (60%) had reported viral infections accompanied by mycoplasmosis, 6 (15%) had reported isolated influenza H9N2 with mixed influenza and infectiou bronchitis in 11 (27.5%) farms and simultaneous Newcastle infection in 7 (17.5%) farm. In other words, simultaneous dual combination of infection was reported in 9 (22.5%) farms and triple infection in 4 (10%) farm. The most reported infective agents were influenza, bronchitis and Newcasle viruses, and mycoplasma. Simultaneous infection with influenza, bronchitis and Newcasle viruses have been previously reported (7,11).

CONCLUSION

In southern Iran, the organisms causing the highest rate of infection were the influenza and bronchitis viruses, and mycoplasma.

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