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*Short communication*

# Prevalence of inclusion body hepatitis (IBH) in Poland from 2010-2014

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## Abstract

This study investigated the prevalence of inclusion body hepatitis (IBH) infections during the past five years (2010-2014) in broiler chicken flocks in Poland. The diagnosis of IBH was based on anatomopathological investigations and histopathological analyzes. IBH was the most prevalent disease in broiler flocks in Poland (10.4%) during this time period, and occurred as a primary infection. The fewest cases of IBH occurred in the summer, suggesting that the temperature may have been a possible stressor that increased susceptibility to IBH. However, over the last 5 years the occurrence of clinical IBH cases in Poland has systematically decreased.

**Key words**: inclusion body hepatitis (IBH), chickens, Poland

## Introduction

Inclusion body hepatitis (IBH) is an emerging pathogen that has economic significance for the global chicken industry (Gomis et al. 2006, Ojkic et al. 2008, Nakamura et al. 2011). IBH is an acute, viral infection that affects broiler chickens between 2 and 7 weeks of age. The disease manifests suddenly, has a short clinical course (4-5 days), and is associated with increased mortality rates generally from 1-20% (Gomis et al. 2006, Nakamura et al. 2011), but occasionally exceeding 30-40% (Erny et al. 1991). Infected chickens typically have pale, friable, swollen livers with focal to extensive necrosis, and large basophilic inclusion bodies in hepatocytes (Reece et al. 1986). The pathogenesis of IBH is not clearly understood as it is influenced by multiple factors including the host, pathogen, toxins and the environment (Erny et al. 1991, Mendelson et al. 1995, Singh et al. 1996, Gomis et al. 2006). Currently, infection with fowl adenovirus (FAdV) is the primary cause of IBH. In Poland, FAdV infection was confirmed in over 12% of analyzed samples, but in most cases liver gross lesions were not observed (Niczyporuk et al. 2013). As the epidemiology of IBH has not been studied in Poland to date, this study was conducted to evaluate the prevalence of IBH in Polish flocks.

## Materials and Methods

The study was carried out using tissue samples collected for histopathological examination by pri-

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Table 1. Number of IBH positive samples by month and year.

| Month | Year | | | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | | |
| | IBH | All* | IBH | All | IBH | All | IBH | All | IBH | All | IBH | All |
| January | | 5 | 1 | 2 | 3 | 22 | 3 | 20 | | 10 | 7 (11.9%) | 59 |
| February | | 5 | 2 | 2 | 3 | 13 | 1 | 16 | | 9 | 6 (13.3%) | 45 |
| March | 3 | 14 | 3 | 9 | 3 | 29 | 3 | 17 | 1 | 23 | 13 (14.1%) | 92 |
| April | 3 | 16 | 4 | 15 | | 11 | 3 | 22 | | 15 | 10 (12.6%) | 79 |
| May | 3 | 5 | 7 | 22 | 2 | 12 | 2 | 29 | | 23 | 14 (15.4%) | 91 |
| June | 1 | 8 | 7 | 24 | 1 | 22 | | 12 | 1 | 9 | 10 (13.3%) | 75 |
| July | 1 | 10 | | 3 | 1 | 9 | | 9 | | 13 | 2 (4.5%) | 44 |
| August | 2 | 8 | | 31 | | 6 | | 11 | | 12 | 2 (2.9%) | 68 |
| September | | 12 | 1 | 15 | | 6 | 1 | 13 | 1 | 15 | 3 (4.9%) | 61 |
| October | 1 | 3 | 1 | 25 | 2 | 19 | 1 | 10 | | 21 | 5 (6.4%) | 78 |
| November | | 3 | 3 | 15 | 3 | 37 | | 7 | 2 | 14 | 8 (10.5%) | 76 |
| December | 1 | 1 | | 10 | 3 | 14 | | 14 | | 10 | 4 (10.2%) | 39 |
| Total | 15 (16.7%) | 90 | 29 (16.9%) | 172 | 20 (10.0%) | 200 | 14 (7.8%) | 180 | 5 (2.9%) | 174 | 85 (10.4%) | 816 |

* All indicates the total number of broiler chickens tested

Table 2. Number of IBH cases by age and concurrent disease.

| Weeks of life | Total number of cases | Other diagnosed health problems |
|---|---|---|
| 1 | 1 | Bacterial infection |
| 2 | 16 | |
| 3 | 16 | |
| 4 | 25 | Marek disease |
| 5 | 18 | IB, Bacterial infection (2x) |
| 6 | 8 | Bacterial infection (4x) |
| 7* | 1 | Bacterial infection, reovirus |

* production cycle was prolonged because of low body weight in the flock

vate-practice veterinarians between 2010 and 2014 from commercial flocks (>20,000 birds/flock) of broiler chickens from Poland at the Department of Pathology, Wroclaw University of Environmental and Life Sciences. The tissues analyzed included the liver, kidney, spleen, heart, lung, bursa of Fabricius, gizzard, proventriculus, pancreas, duodenum, and ileum. The samples were fixed in 7% buffered formalin for 24 hours, embedded in paraffin, and cut into 4 µm sections. The sections were stained using hematoxylin and eosin. Microphotographs of the samples were analyzed using computer-assisted image analysis with an Olympus BX53 (Olympus, Japan) optical microscope. All measurements were performed using cell^ software (Olympus Soft Imaging Solution GmbH, Germany).

## Results and Discussion

Over a 5-year period, histopathological examinations were performed on 816 samples from commercial broiler flocks in Poland (Table 1). IBH was generally confirmed retrospectively by histopathological examination by the presence of typical lesions, including basophilic intranuclear inclusion bodies, necrosis, congestion, and blood stagnation in the liver. Of the 816 samples, 85 (>10%) were classified as IBH positive. The high frequency of IBH infection makes it the most prevalent disease in commercial broiler chicken flocks in western Poland. This is also consistent with a high rate (29%) of microscopic liver lesions typical of IBH reported by Dolka et al. (2012) in samples obtained from birds between 1999 and 2010. The age

of IBH positive chickens ranged from 1 to 7 weeks, but the highest prevalence was observed in the 4th week of life (Table 2). This is consistent with published data from other authors (Singh et al. 1996, Nakamura et al. 2011, Dolka et al. 2012, Niczyporuk et al. 2013). In the samples from broiler chickens that were in their 2nd and 3rd week of life IBH seemed to be a primary infection. In older birds, other viral and bacterial infections were diagnosed simultaneously. Historically, IBH has been identified as a secondary disease, often associated with common immunosuppressive diseases such as infections bursal disease, Mareks disease, chronic respiratory disease, airsacculitis, rickets, coryza, coccidiosis, encephalomalacia, and vitamin A deficiency (Fadly et al. 1976, Singh et al. 1996, Niczyporuk et al. 2013). However, a small number of studies have identified IBH as a primary disease that has no apparent association with immunosuppressive diseases (Christensen and Saifuddin 1989, Gomis et al. 2006). An alternative cause for IBH outbreaks may be related to stress. We found the fewest number of IBH cases (15%) were diagnosed from July to October, when temperatures in Poland are high (usually >20°C) and there are no large, rapid decreases in the temperature. In contrast, in the autumn, winter, and spring there are large variations in temperatures between the months, and in some months temperatures vary widely between the day and night. A similar observation regarding the concurrence of IBH infection and the seasons was also noted by Mittal et al. (2014) in Pakistan. Mittal et al. noted that a larger number of broiler flocks were affected with IBH in the winter and rainy seasons. In addition, most outbreaks in India (>50%) were recorded during October, November, and December when the temperatures are the coolest, decreasing by approximately 5°C per month. The authors also demonstrated a correlation between the large number of outbreaks during these months and the temperatures and relative humidity each month; they suggest that high levels of mycotoxins may be an indicator of IBH (Singh et al. 1996). Niczyporuk et al. (2013) have shown that the number of FAdV infections occurring each year in Poland has been increasing. In contrast, our data shown that the number of clinical IBH cases has decreased (Table 1), which may be the result of high quality of flock management to ensure optimal living conditions for the birds.

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