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Poultry Health Services

Inclusion Body Hepatitis (IBH)

Sudden mortality and low morbidity in a flock together with enlarged pale/straw-colored livers can be indicative of an Inclusion Body Hepatitis (IBH) case. Was your mortality normal so far and now suddenly spiking? Are your birds depressed, crouching with ruffled feathers before they drop dead? Are you observing large pale livers sometimes with hemorrhages or even with hydropericardium? How much of your flock is affected? Is this a recurrent issue? Are you having a sudden spike in mortality?

Although there are important rule outs for a clinical case with sudden mortality and enlarged livers, including intoxication by mycotoxins (i.e. Aflatoxins), bacterial infection (e.g. Colibacillosis, Salmonellosis), and pulmonary hypertension syndrome (a.k.a. Ascites syndrome) , the most important rule out is a viral disease known as IBH due to the characteristic histopathological inclusion bodies the virus produces inside liver cells. In this short article, we aim to explain what IBH is, describe some contributing factors, some characteristics of the challenge strains detected in 2020, and some control strategies implemented in the field. IBH is not a new disease, but one that requires constant control due to its extreme resistance to environment and wide presence in poultry farms.

What is IBH?

First reported in 1963, this disease is one of many clinical manifestations of infection by Fowl Adenovirus (FAdVs), mainly strains from species D, and E. FAdVs can be classified in 12 different serotypes (ICTV) distributed in 5 different species (A,B,C,D, and E) (See Table 1).

FAdV Species	FAdV Serotype (ICTV)	Associated Diseases
A	1	Quail bronchitis, gizzard erosion
B	5	No data.
C	4,10	Hepatitis-Hydropericardium Syndrome (HHS)
D	2,3,9,11	IBH
E	6,7,8a,8b	IBH

Table 1. List of FAdV species, serotypes, and associated diseases. Adapted from Diseases of Poultry 14th Edition, 2020.

It is important to note that IBH is considered as a secondary disease in many other regions/countries and not able to cause disease without the involvement of a primary insult. This can be produced by an immunosuppressive agent (e.g. Infectious Bursal Disease Virus [IBDV], Chicken Anemia Virus [CAV], Marek's Disease Virus [MDV], Avian Reovirus [ARV]), mycotoxins, or an environmental stressor. Currently, it has been shown that some Canadian FAdV strains are able to cause disease without the contribution of a primary pathogen, which highlights the importance of proper control.

IBH is characterized by causing severe liver lesions in young birds (usually up to 35 days of age). Affected birds have pale and swollen livers, which in its initial stages may show small white foci with or without hemorrhages on the liver surface. Swollen kidneys and affected pancreas are common findings; and yellow and mucoid droppings can be observed. As many FAdV are non-pathogenic, diagnostic of IBH should always consider the clinical history, and histopathology. Molecular tests results would shed light on what type of serotype is responsible and help designing a control strategy, as there is little cross-protection between serotypes. As a result of the severe liver and pancreas lesions, broilers suffer a metabolic imbalance which leads to sudden death, which can cause a slight increase in mortality (in birds from vaccinated flocks) or as high as 30% in birds without any maternal protection. In an average IBH outbreak, according to our experience, the mortality increases suddenly and peaks within 3-4 days, stay steady for another 3 days, and ceases after 6-10 days.

When and why does IBH occur?

The disease occurs mainly in broiler chickens between 2-3 weeks of age (as young as 4 days up to 7 weeks of age). The virus is transmitted horizontally (from bird to bird), as well as vertically (from hens to progeny). Outbreaks in birds younger than 3 weeks seem to be associated with higher mortality and are more suggestive of vertical transmission than horizontal transmission.
As a naïve (never infected with FAdV) parent stock is infected by FAdV during the laying period, embryos are infected with the virus, which upon hatching and placement in the farm, shed the vertically transmitted virus to a susceptible population of young birds from, perhaps, many different parent stocks. The dynamics of virulence of the FAdV strain, other pathogens/stressors in the barn, level of shedding, and number of birds initially infected may influence the age the flock breaks and the intensity of the disease. Furthermore, cross infections with more than one FAdV serotype are commonly found, suggesting that progeny from different breeder flocks may be contaminated with different serotypes of FAdV and that there is little cross-protection between serotypes.

This disease has been controlled in Canada for many years through parent stock vaccination with inactivated vaccines developed using local isolates (autogenous vaccines). These vaccines are applied before laying period to build immunity against selected serotypes and reduce the likelihood of primal infection during laying period (and thus vertical transmission) as well as to provide the progeny with maternal antibodies, conferring protection against horizontal transmission. As protection is serotype-specific, it is very important to monitor clinical cases and to include the proper serotype in the autogenous vaccine program. Control of IBDV, CAV, and MDV, as well as other important stressors are important for preventing

severe outbreaks of IBH. During 2020, PHS has identified IBH cases are being caused mainly by serotypes 8b, 11, and 8a, all which have been included in the autogenous vaccine program. FAdV Serotype 4 has also been identified in mixed infections but only in few cases in Ontario.

What do I do if I think I have IBH in my flock?

Start with a diagnosis from your vet and an accredited lab. Proper collection and sample submission will greatly increase the success in a definitive diagnosis. There is no treatment for this disease, so a proper monitoring system is required to build autogenous vaccines including the relevant strains the industry needs to protect the flocks. Affected birds will not recover from the decease, thus the economic impact can be reduced through good management practices (e.g. proper distribution of feed and water, suitable environment), and culling of the affected birds.

Outbreaks in birds younger than 3 weeks seem to be associated with higher mortality and are more suggestive of vertical transmission than horizontal transmission. It is important in these circumstances to contact your local veterinarian for PCR testing and virus isolation (eventual sequencing). This will help the veterinary team in outbreak situations to confirm the IBH isolate matches what is being added into the autogenous vaccine and administered to the broiler breeders.

It is important to note that maternal antibodies in the field have an expiration date- for broilers, the half-life (time in which antibodies reach the 50% of its highest concentration) is 4-7 days for most common diseases (e.g. CAV, IBDV). Most maternal antibodies are gone by 10 days of age, underlining the importance of reducing the viral load in the barn and biosecurity to prevent entry of challenge into the barn.

Adenoviruses, together with Reoviruses, are amongst the most resistant virus on earth. Removal/treatment of built-up litter, heat treatment of affected houses during downtime, and increased downtime will decrease the viral load for the next production cycle. In short, a thorough cleaning and disinfection process is crucial to diminish the economic impact of the disease.

For Farms with re-occurring challenges of Inclusion Body Hepatitis it is important to complete a thorough **clean and disinfection** of the barn. It is also important to note that vectors such as beetles and flies have been known to harbour the virus and play a role in re-infections.

1. **Dig around outside of barn and spray for beetles**

Agita 10WG/Tempo/Credo is used in the control of *Alphitobius diaperinus*. Maintaining heat in the barn after the birds have been shipped and turning the lights off will keep beetles in the manure, allowing application of the insecticide along the edges of the barn (clear a 3 foot area along the walls). When the barn cools and the lights are turned on the beetles will escape back into the walls, travelling over the insecticide. A second application on the floor and three feet up the walls is warranted after the barn is cleaned and before adding new bedding.

2. **Spray for flies**

Managing the fly population within a facility is accomplished by using approved baits and

sprays. Fogging the barn after the birds have been removed with an aerosol insecticide will help to eliminate adult flies.

3. **Push out manure from barn**

Remove all residual feed within the hoppers/feedlines/pans. Remove all manure from the barns and store/spread the contaminated manure offsite and away from the farm as soon as possible.

4. **Blow down organic material**

This includes heaters, fan blades, light fixtures, louvers, vents, ceiling, feed pans, walls, floor and any other equipment in the barn.

5. **Hot water wash with detergent**

Hot water wash all surfaces with a detergent. Apply the detergent at low pressure first and allow an adequate amount of time to soak. Pressure wash with hot water (not over 140 Fahrenheit) before the detergent dries on the surface. Surfaces to be washed include walls, fans, louvers, vents, drinkers and feeders. Wash all service rooms and mortality buckets.

6. **Rinse**

Thoroughly rinse all areas where detergent was used. Waterlines must be flushed and cleaned with a suitable product (hyperox, proxyclean, virocid) and protocol.

7. **Disinfect**

Example products are Prevail, Virocid, or Virkon.
Maintain the barn at room temperature or 20°C for cleaning. Disinfect all exposed surfaces in the barn. Wash and disinfect all boots, coveralls and equipment used for pushing out the barns. Take careful attention to the inside of the tire wells on skid steers and loaders.

8. **Fog with a disinfectant**

With cycles of repeated disease challenge, it is recommended to fog the barn with a disinfectant.

9. **Manage again for flies and beetles before THE NEXT placement.**

Recheck and manage fly and beetle population in barns where there has been evidence during previous grow out period.

10. **Shavings, Feed, Heat Treating**

4-5 days before chick placement, the shavings and feed can go down in the barn. This is still considered downtime. It is also beneficial to heat treat during the warmer months at 100°F for 100 hours.

***Downtime starts when the barn is disinfected and dry; would aim for 10-14 days at 10-20°C**

This article was written by the veterinarians of Poultry Health Services Ltd.

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