



INCLUSION BODY HEPATITIS (IBH) EXPERIENCE IN BROILERS IN ONTARIO

Path Manathan, DVM, ACPV
Poultry Consultant, "PATHSTEC" Consulting Services
Guelph, Ontario

Summary & Future Consideration:

Fowl Adenovirus was found to be the important pathogen in year 2002 IBH losses in broilers through vertical transmission.

Ontario fowl adeno field isolate similar to serotype 8a found to be virulent than isolates matched serotype 11.

Pathogenicity challenge study of these two main isolates and continuous field tracking of all IBH cases for adenovirus isolates are necessary to understand the fowl adenovirus serotype diversity and to incorporate the necessary field isolates in breeder autogenous killed vaccine when needed to control IBH outbreaks in broilers.

All broilers are usually subject to varying degrees of immune challenge as a result of infection with Bursal Disease virus, CAV (Chicken Anemia virus), Marek's disease virus and during stress management. Role of the adenovirus in these conditions was found to be a secondary pathogen. Few broiler flocks have exhibited IBH losses due to immunosuppression with non-virulent fowl adenovirus.

General Description:

IBH, a fowl adenovirus Group 1 infection has been consistently diagnosed for many years in Ontario and tends to be an ongoing problem in broiler farms.

All ages of broilers were found to be susceptible even in immunological intact chicks during the first 2-3 weeks of life. Chicks as young as 5 days of age developed IBH. Recurring infections were noticed in 2 or 3 successive flocks on the same farm. Affected

Diagnosis:

Post Mortem:

The liver is the primary organ affected in these birds which is enlarged, pale yellow with multiple petechial haemorrhages. In some cases kidneys appeared swollen and pale due to deposition of urates. Skin and body fat were yellow in colour. Bursa and thymus appeared smaller with no significant pathological lesion noticed in bone marrow



Fig 1: IBH in a 12 day old commercial broiler flock with 9% mortality.

Prevention of immunosuppression in birds at both breeder and broiler levels is necessary, by taking additional care during vaccination for immunosuppressive viruses especially IBH and CAV to avoid missing birds.

The adenovirus eradication is impossible due to its widespread nature. The virus is hardy and highly resistant to common disinfectants and thermal inactivation. Depopulation and disinfection with formalin/formaldehyde has been found effective. It was recommended to use Iodine for foot baths and crate washing.

Prudent measures should be taken when importing breeders or hatching eggs to check into the history with respect to IBH and pathogenic fowl adeno field isolates.

birds showed depression, were weak on their legs and some had ruffled feathers.

Broiler flocks exhibited sudden mortality, which ranged from 5-10%; few flocks even had as high as 20% mortality. Some of these flocks had poor body weight gain, unevenness of growth and lower profit per kg marketed.



Fig 2: IBH liver (Hepatitis) lesion: Enlarged, pale with petechial haemorrhages.

Histopathology:

There were areas of necrosis in which liver cells contained numerous enlarged nuclei filled with basophilic intranuclear inclusion bodies. Bursae showed in some cases moderate to marked follicular atrophy.

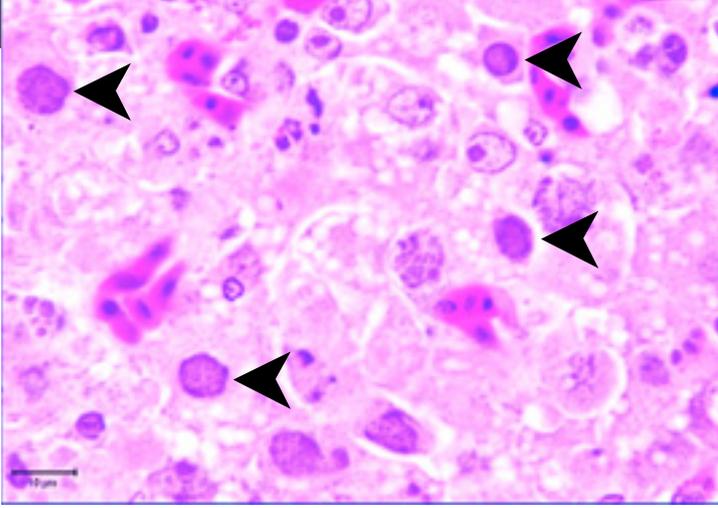


Fig 3: Intranuclear inclusion bodies in liver cells (hepatocytes).
[Slide: Courtesy of Dr. Brian Binningtonc AHL, University of Guelph]

Official Classification:

International Committee on Taxonomy of viruses (ICTV) recently updated the classification of group 1 avian/fowl adenoviruses [Genus: Aviadenovirus].

They are divided into 11 distinct serotypes by virus neutralization tests and five groups species [A-E] on the basis of restriction endonuclease analysis.

Note: Originally, the numbering from 1 to 12 was different in USA and Europe as shown in the chart (right).

Official classification divides serotype 8, 8a and 8b based on cross neutralization tests.

[Chart: Courtesy of Dr. Davor Ojkic AHL, University of Guelph]

Virus Isolation:

Cloacal swabs (faeces) & fresh liver with lesions were used. Virus isolation performed as the routine procedure for serotyping IBH virus, in embryonated eggs/cell culture and by electron microscopy.

Serology:

Even though serum antibodies to avian adenovirus are only of minor relevance to diagnosis due to widespread nature of adenoviruses, the AGID (Agar Gel Immuno Diffusion) test was used to monitor the adenovirus infection status in breeders [pullet farms & production farms] and affected broiler flocks.

Genotyping:

Molecular level PCR & REA (Restriction Endonuclease Analysis) methods are used for detection and typing of field isolates.

Official ICTV species	Official ICTV Serotype/Strain	Serotype USA (AAAP)	Serotype USA (Av Dis '74)	Serotype USA (ATCC)	Serotype USA (SPAFAS)	EU
FAdV-A	FAdV-01 112, Phelps	FAdV-01 Phelps	FAdV-01 QBv, Ind C, E1, T3, QT	AAdV-01 Phelps	AAdV-1 CELO	FAdV-01 CELO
FAdV-B	FAdV-05 340, TR22	FAdV-08 M2, Tipton	FAdV-03 340, 5, M2, IBH, Tipton	AAdV-03 IBH2, A, Tipton	AAdV-03 IBHV	FAdV-05 340
FAdV-C	FAdV-04 KR-5, J-2 FAdV-10 C-2B, M11, CFA20	FAdV-04 J-2 FAdV-10 C-2-B	FAdV-04 506-1, J-2, KR-5 FAdV-09 C-2-B	AAdV-04 J2-A AAdV-09 C-2B	AAdV-04 J2-A AAdV-10 C-2B1	FAdV-04 KR-5 FAdV-11 C-2-B
FAdV-D	FAdV-02 GAL-1, 685, SR48 FAdV-03 SR49, 75 FAdV-09 A2, 90 FAdV-11 380	FAdV-02 27 FAdV-03 - FAdV-09 A2 FAdV-12 -	FAdV-02 77, SR48 FAdV-06 75-1A, SR49 FAdV-08 A-2 ?? -	AAdV-02 P7-A, Fontes AAdV-06 75-1A-1 AAdV-08 A-2A AAdV-10 X-11A ?? -	AAdV-02 P7-A AAdV-06 75-1A-1 AAdV-05 A-2A AAdV-12 DPI AAdV-7 CR-119	FAdV-02 GAL-1 FAdV-03 SR49 FAdV-10 A-2A FAdV-12 380 FAdV-06 CR119
FAdV-E	FAdV-06 CR119, 168 FAdV-07 YR36, X11 FAdV-08a TR59, T-8, CFA40 FAdV-08b 764, B3	FAdV-05 - FAdV-11 YR36, X-11 FAdV-06 TR59 FAdV-07 B3	FAdV-10 X-11 FAdV-05 58-1, T-8, Q-1A, U-6, TR59 FAdV-07 764, B3	AAdV-5 T8-A AAdV-7 B-3A ?? ??	FAdV-08 TR59 AAdV-9 B-3A AAdV-7 B-3A AAdV-12 DPI AAdV-7 CR-119	FAdV-08 TR59 FAdV-09 764 FAdV-07 X-11 FAdV-08 TR59 FAdV-09 764

Epidemiology:

Ontario Isolation:

Based on the genotyping results from broiler cases submitted in 2002, the isolates found to be similar to Fowl Adenovirus Serotype 8a (T-8) in group E genotype. In 2003, the isolates matched Fowl Adenovirus Serotype 11(380) in group D genotype.

Note: IBH mortality in broilers with Serotype 8a was very high; up to 20% in certain flocks.

Discussion

- In 2002, most of the cases of IBH occurred in young broilers 7-21 days of age, which were related to a couple of susceptible young breeder flocks infected with pathogenic fowl adenovirus prior to lay. Consequently, the vertical transmission of the virus to hatching eggs to occurred broiler progeny.
- A few IBH cases were in broilers from older breeder flocks where mixing of “spiking” males could have introduced the pathogenic adenovirus or resulted in reactivation of latent virus in the flock.
- In 2003, most of the cases were in broilers over 3 weeks of age where infection could have occurred in the broiler barn environment in immunosuppressed birds or due to reactivation of latent virus when maternal protection for adenovirus declines.
- The number of AGID reactors varied among farms. Serology results showed many replacement birds in the breeder farms have not been exposed to any type of adenovirus infection, suggesting the possibility that these birds became infected just prior to lay, allowing for the vertical transmission of the virus to occur.

Sponsored by Intervet Canada



**Celebrating 20 years of Serving
Canada's Poultry Industry**

References:

*Davor Ojkic/Brian Binnington IBH - An Old Enemy Here to Stay
John Brian McFerran - Adenovirus Infections - Diseases of Poultry*

