



# Technical Bulletin

Information from Phibro Technical Services

## ***Infectious Bronchitis control solutions***

Infectious bronchitis virus (IBV) is a coronavirus that causes a highly contagious disease in chickens. The virus can affect the upper respiratory tract and the reproductive tract, and some strains can cause a nephritis.

The disease is reported only in chickens and chickens of all ages and segments are susceptible to infection.

The type and severity of the clinical signs varies dependent mainly on IB field strain and on age, type of bird and health status.

In general, the disease is highly contagious, the incubation period is short and clinical signs will appear throughout the flock within 36-48h post infection (PI).

The mortality and damage can be low and the birds can recover within 7 days PI. However, it is usually complicated by secondary infections (E.coli, MG) that often cause high mortality and severe damage to the performance in broilers and breeders.

For example, a drop of 5-10% in egg production for 1-2 weeks may become 50% and last longer if complicated with MG.

In broilers the most frequent clinical signs are respiratory (coughing, sneezing, rales, nasal and eye discharge) and less frequently kidney or renal lesions (high morbidity, watery droppings, dehydration and mortality). Birds also appear depressed and will often huddle.

In Breeders & layers the disease appears with respiratory signs followed by reduction in egg production as well as production of thin, irregular shells with watery albumen. With certain IB field strains (QX, Variant 2) oviduct cysts can also develop and in these cases many birds will show a “Penguin Posture”

Breeders that contract the disease at a young age (up to 2 weeks) can develop severe and permanent damage to the oviduct leading to an inability to lay eggs (“silent layers”).

*Respiratory lesions:*



*Egg abnormalities*



*Kidney lesions:*



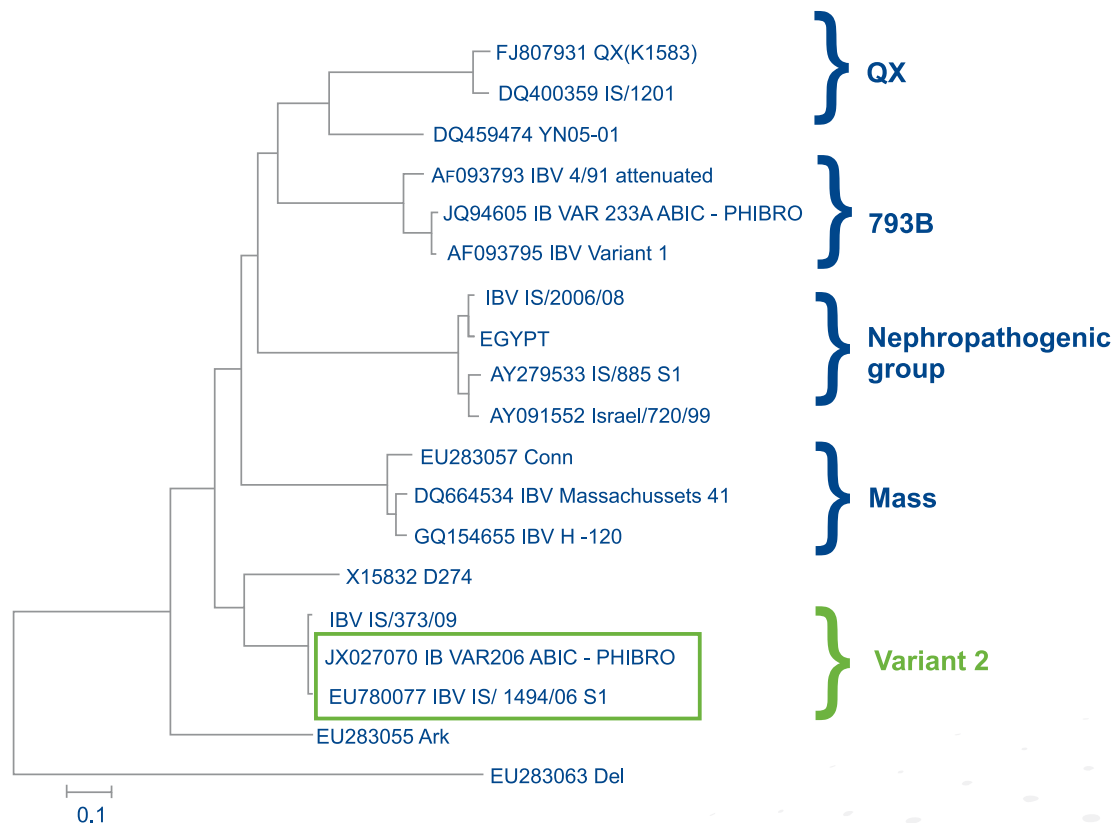
*Oviduct cysts*



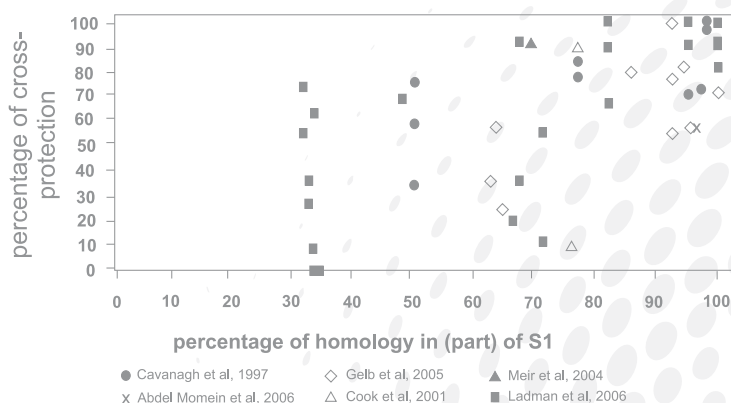


Different serotypes and genetic types of the virus have been identified worldwide and, for the most part, do not cross-protect. In addition, new strains of the virus continue to arise due to mutations and recombination events in the viral genome, making this virus difficult to identify and extremely difficult to control.

## Phylogenetic tree of IB strains and vaccines:



Control of IB infections is by means of vaccination with inactivated, preferably homologous, IB strain vaccines and with the limited number of live attenuated virus vaccines that are currently registered. A major concern with the use of the live vaccines is that there is little correlation between the degree of genetic homology of the S1 gene of the vaccine strain and the S1 gene of the field strain with the level of protection offered. The table below shows this lack of correlation very well (De Witt et. Al. ISSN 2010)



Vaccination programs, therefore, may need to be adapted on a regular basis to ensure effective levels of protection.

An effective IB vaccination program will include the use of a homologous strain (if possible) or a number of different virus strains in an effort to maximize cross protection in the field.

**Figure 1 - Correlation between the level of homology in (a part) of the S1 glycoprotein of IBV strains and the level of cross-protection between these strains as reported in six papers.**



## Phibro IB vaccine range

Phibro Animal Health has many years of experience in the development, and use of, live IB vaccines and can offer some unique solutions for the control of variant IB field challenges.

### **TAbic® IB VAR**

#### **Early and robust protection against variant IB strains**

TAbic® IB VAR is a live Infectious Bronchitis virus vaccine strain (233A) that was attenuated from the IS233 field strain. This strain falls into the 793B group of Variant IB viruses, which includes the 4/91 field strain.

TAbic® IB VAR allows for easy PCR diagnostics. It is a unique strain, unrelated to any virulent field strains and can, therefore, be easily distinguished from field strains by PCR.

TAbic® IB VAR has been shown to cause minimal damage to the Respiratory, Reproductive and Uro-genital systems.

TAbic® IB VAR provides protection against 793B variant IB strains as well good cross protection against Variant 2 strains and some QX like strains.

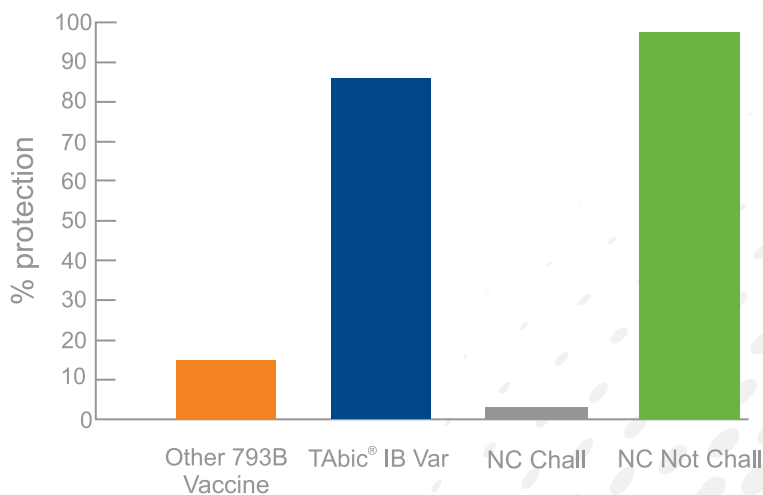
TAbic® IB VAR can be given together with our V.H. Newcastle disease vaccine.

TAbic® IB VAR is registered for use in Broilers, Breeders and Layers from Day Old and in lay.

TAbic® IB VAR can be administered by Eye drop and Coarse spray, even in Day Old chicks.

#### **Trial data:**

**TAbic® IB VAR provides better protection from challenge with a homologous 793B strain (1365 strain) than a commercial 4/91 vaccine strain:**



(SPF chickens vaccinated by eye drop at 14d of age and challenged at 35 days of age.)

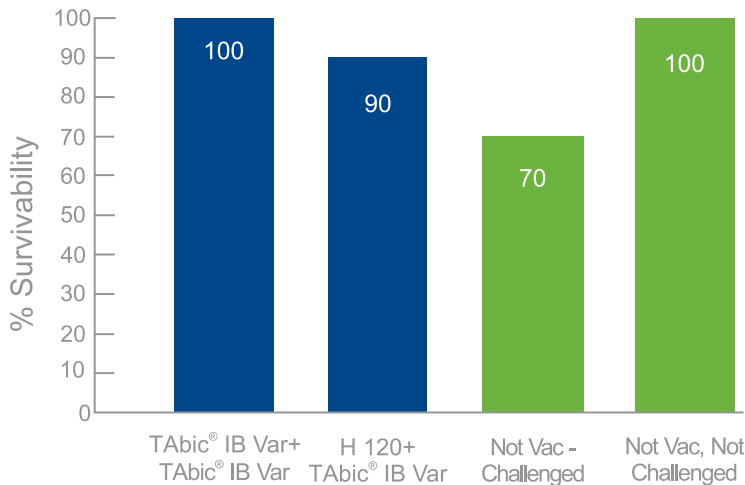


### 100% protection against challenge of chicks vaccinated twice with TABic® IB VAR:

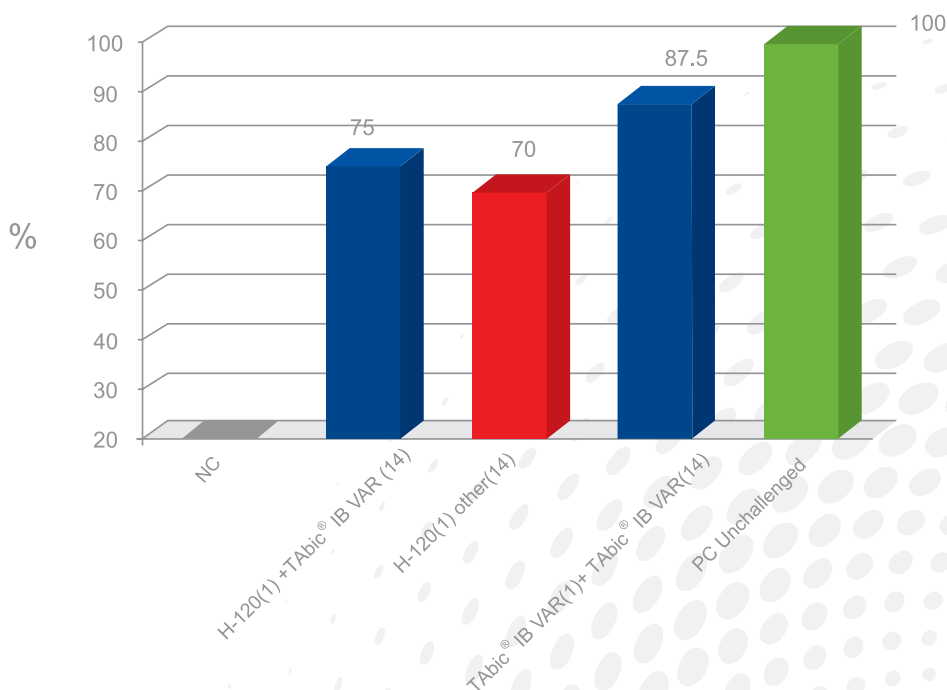
Two groups of SPF chicks were vaccinated at 1d & 14d with H120 + TABic® IB Var and TABic® IB VAR + TABic® IB VAR respectively.

Two other groups, non-vaccinated and challenged, non-vaccinated and not challenged served as controls.

All groups were challenged with YN05-1 (Chinese QX like) strain at 35 days of age and were observed for mortality and pathological signs.



### Protection levels (as measured by ciliastasis) achieved by TABic® IB VAR vaccine against challenge with heterologous Virulent Variant 2 field strain:





# TAbic® IB VAR206

## The only solution to Variant 2 strain control

TAbic® IB VAR206 is the only solution to IB Variant 2 field infections. This vaccine strain was attenuated from a Variant 2 field strain IS/1494/06 (Accession no. EU780077) that was identified in Israel in 2006.

Variant 2 is a very virulent IB virus, causing mortality rates in excess of 30% in broilers. Affected chickens demonstrate respiratory signs and severe nephritis. Early infection of replacement layer and breeder chicks results in cystic oviducts and birds with a “silent layer syndrome”.

Variant 2 differs from the 793B and Massachusetts strains by close to 15% in its S1 nucleotide sequence, hence the need for a specific vaccine.

TAbic® IB VAR206 allows for easy PCR diagnostics. It is a unique strain, unrelated to any virulent field strains.

TAbic® IB VAR206 can be used in broilers, layers and breeder birds.

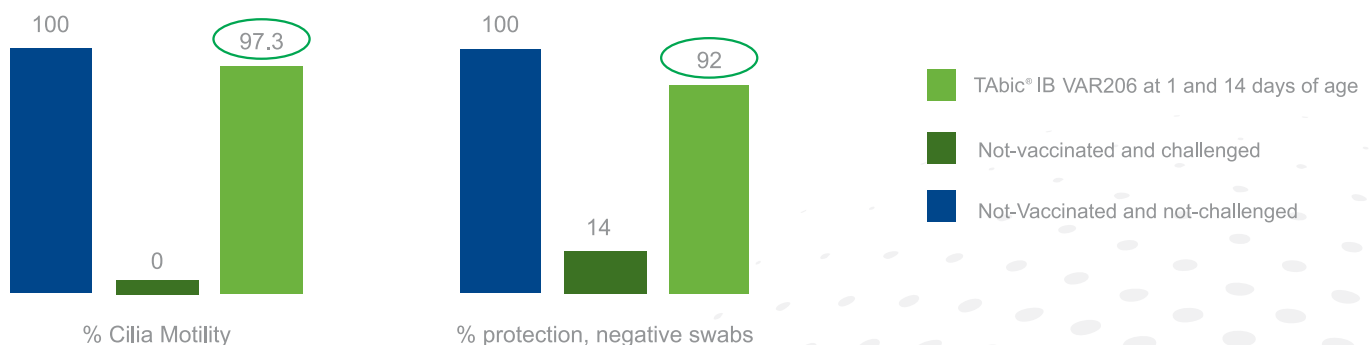
TAbic® IB VAR206 can be administered by Eye drop and Coarse spray from Day Old as well as in lay.

TAbic® IB VAR206 causes minimal damage to the respiratory and urinary systems in broilers at all ages.

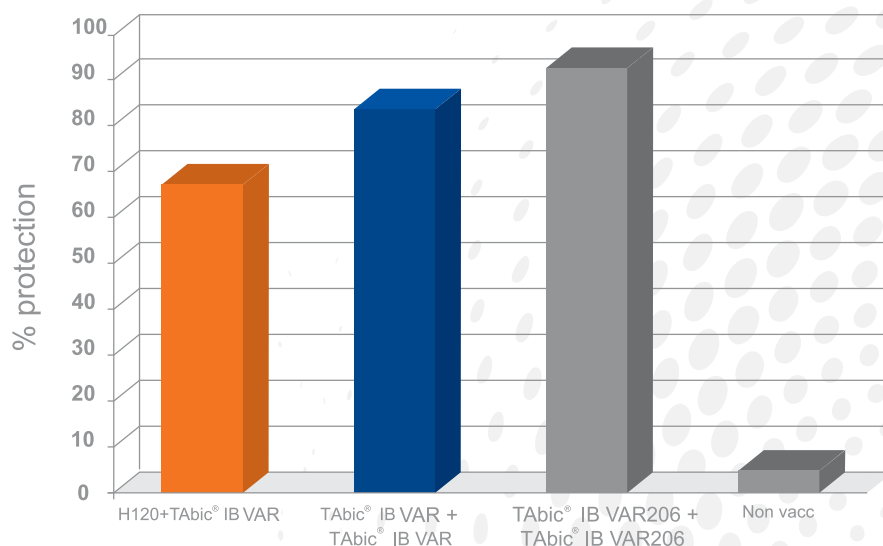
TAbic® IB VAR206 can be given together with our V.H. Newcastle disease vaccine.

### Trials:

#### Protection from challenge in SPF chickens vaccinated at 1 and 14 days of age with TAbic® IB VAR206 vaccine and challenged with homologous virulent field strain Variant 2:



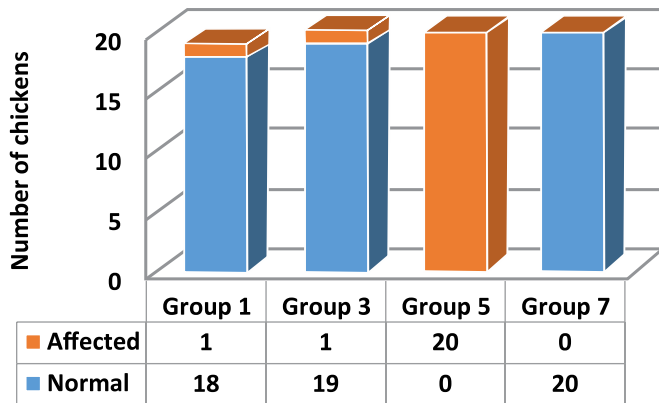
#### Protection levels (as measured by ciliastasis) achieved by different vaccination programs against challenge with heterologous Virulent Variant 2 field strain:





## Efficacy trial of TABic® IB VAR206 and TABic® IB Var vaccine combinations in SPF birds against challenge with South African isolates of IB QX & 793B field strains:

Figure 1. Collated ciliary motility scores for groups challenged with the 793B field strain



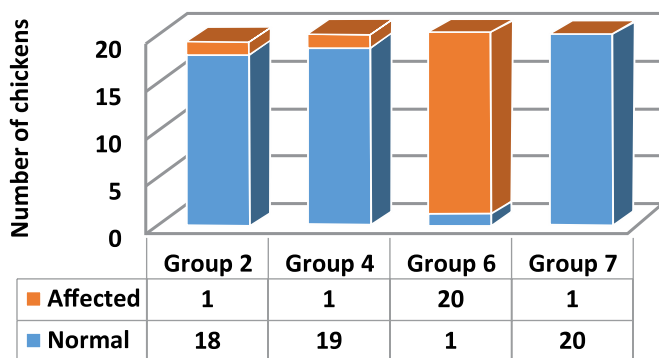
Group 1: TABic® IB VAR206 x TABic® IB VAR206 vaccinated

Group 3: TABic® IB VAR x TABic® IB VAR206 vaccinated

Group 5: unvaccinated challenge control

Group 7: unchallenged negative control

Figure 2. Collated ciliary motility scores for groups challenged with the QX-like field strain



Group 2: TABic® IB VAR206 x TABic® IB VAR206 vaccinated

Group 4: TABic® IB VAR x TABic® IB VAR206 vaccinated

Group 6: unvaccinated challenge control

Group 7: unchallenged negative control

Figure 3. Mean viral titres of birds challenged with  $10^{4.0}$  EID<sub>50</sub> of a South African 793B field strain

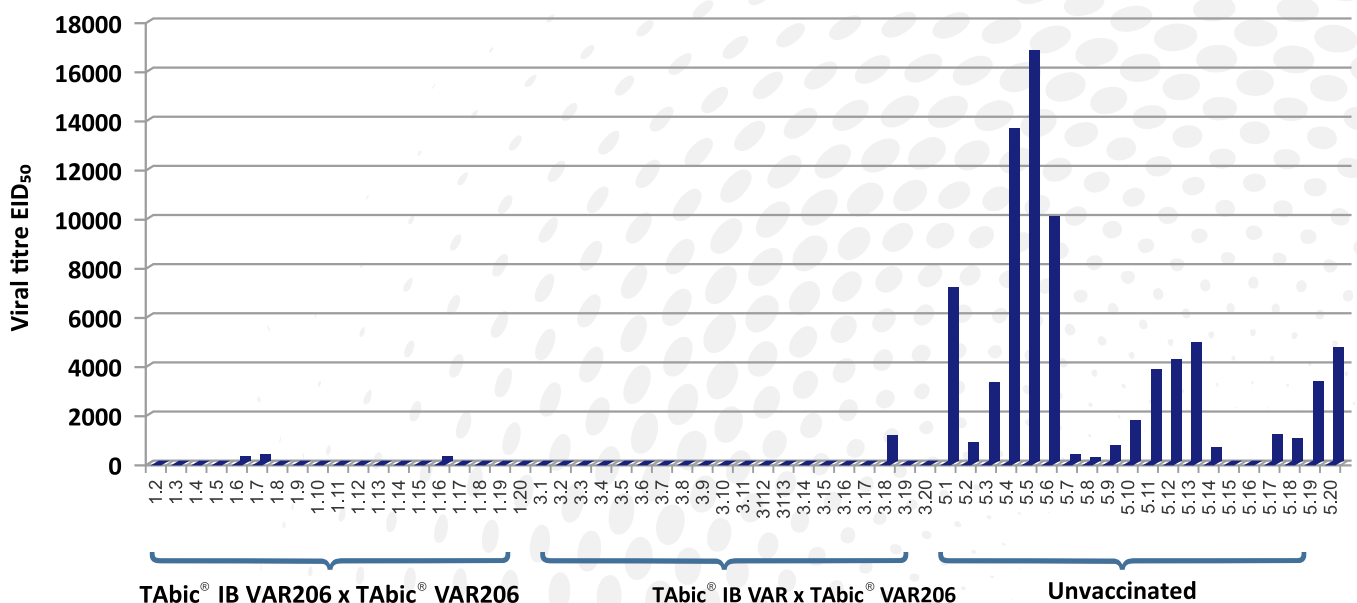
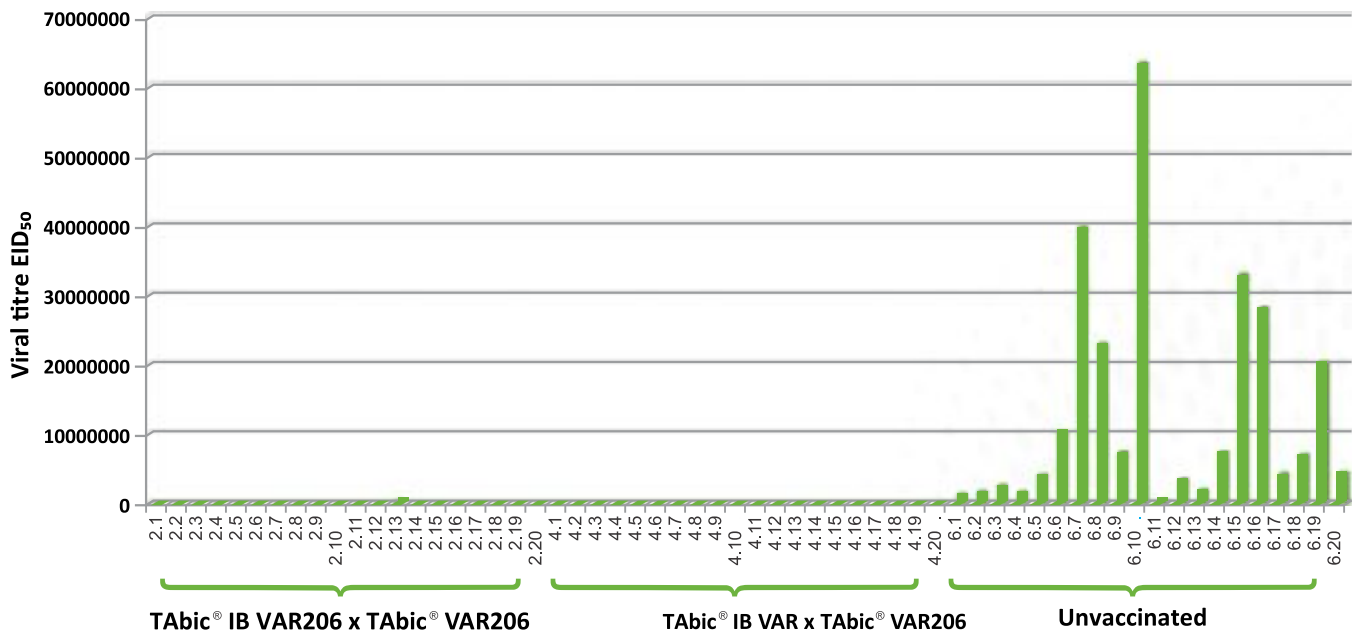


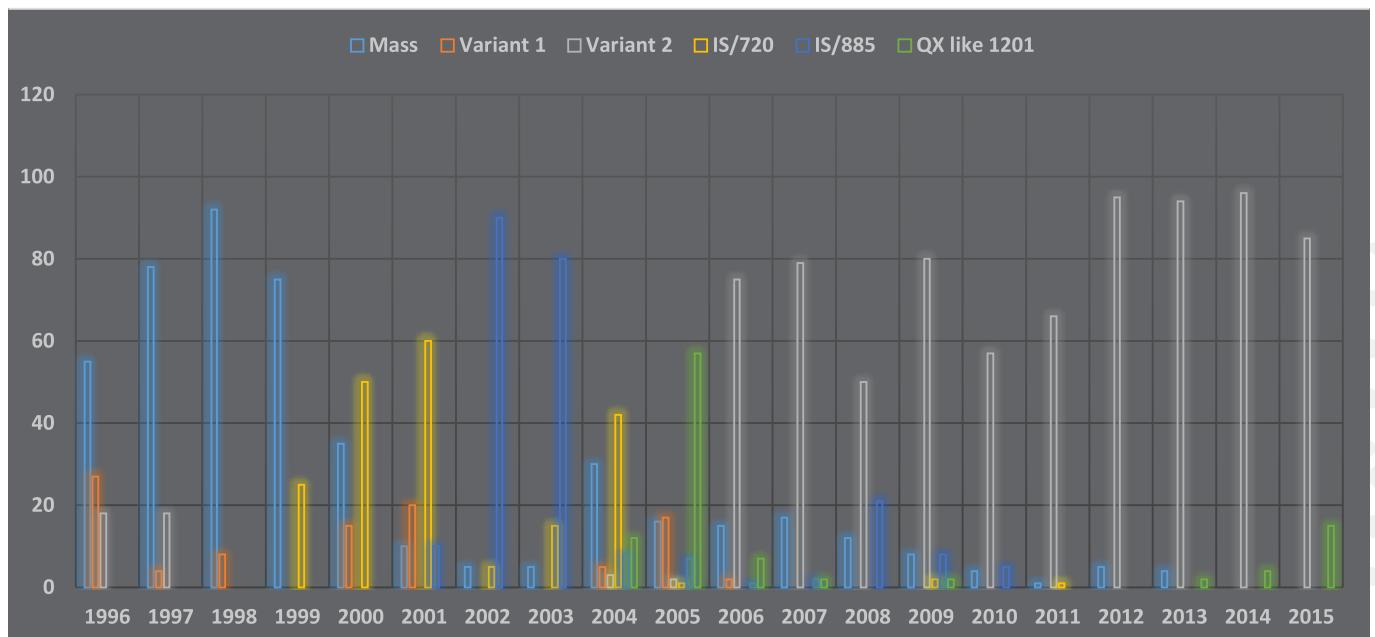




Figure 4. Mean viral titres of birds challenged with  $10^{4.0}$  EID<sub>50</sub> of a South African QX-like field strain



## Incidence of IB virus strains over time in Israel:



This graph indicates the number of isolations of the various IB strains in Israel from 1996 to 2015. It is interesting to note that once the Variant 2 field and vaccine strain became prevalent in the country the number of isolations of the other strains decreased significantly. This may indicate that the Variant 2 field strain and the TABIC® VAR206 vaccine have the ability to competitively exclude other strains.

This fact, together with the cross protection study results, means that TABIC® IB VAR206 may be able to play a vital role in protecting birds from new field strains for which there are currently no homologous vaccines available.



## **TAbic® H-120**

TAbic® H-120 is a lyophilized attenuated live Infectious Bronchitis vaccine, containing the mild H-120 (HUYBEN 120) strain. The origin of this strain is from a Massachusetts IBV serotype that was isolated in Holland by Bijlenga (1956 H-52 strain) and attenuated by Hoekstra & Rispens (1960) to the current H120 strain.

TAbic® H-120 has been shown to provide cross-protection to a range of heterologous IBV serotypes worldwide and is still the most widely used live IB vaccine strain in the world.

TAbic® H-120 can be applied in combination with our Newcastle disease V.H. strain and with our other IB vaccines.

TAbic® H-120 can be used in all ages and all species of chickens.