# A Field Study on the Evaluation of MB-1® Vaccine Against Infectious Bursal Disease in Broiler Chickens

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XXIIIrd WVPA CONGRESS
WORLD VETERINARY POULTRY ASSOCIATION
KUCHING, SARAWAK - MALAYSIA 2025

**Introduction**

Infectious Bursal Disease (IBD), commonly referred to as Gumboro disease, represents a significant challenge in poultry health, particularly affecting young broiler chickens. This viral disease, caused by the Infectious Bursal Disease Virus (IBDV), is characterized by mortality and severe immunosuppression, leading to increased susceptibility to secondary infections and substantial economic losses in the poultry industry worldwide (Adino & Bayu, 2022; Dey et al., 2019; Rautenschlein & Alkie, 2016). The pathology of IBD includes the destruction of B lymphocytes in the bursa of Fabricius, which are critical for the immune response in chickens (Rautenschlein & Alkie, 2016; Ahmed et al., 2024). The clinical manifestations of IBD can vary, ranging from depression and diarrhea to more severe outcomes such as high mortality rates (Dey et al., 2019; Shafi et al., 2024).

Vaccination remains the cornerstone of IBD management, with various vaccine types being employed to mitigate the impact of this disease (Sedeik et al., 2019; Dey et al., 2019). The MB-1® vaccine, a novel immunization strategy, has garnered attention for its potential efficacy against IBDV. Previous studies have highlighted the importance of effective vaccination protocols in controlling outbreaks and reducing the prevalence of IBD in commercial flocks (Xu et al., 2019; Adino & Bayu, 2022; Sedeik et al., 2019). However, the emergence of new virulent strains of IBDV necessitates continuous evaluation of existing vaccines to ensure their effectiveness (Rautenschlein & Alkie, 2016; Ahmed et al., 2024).

This field study aimed at evaluating the efficacy of the MB-1 and immune complex vaccines against IBD in broiler chickens.

**Materials and Method**

**Chickens and sampling:**

Eight houses of broilers chickens (Ross) were vaccinated with two different hatchery Gumboro vaccines in two consecutive cycles and five FTA bursa samples and 5 bursa organs in formalin were collected from each house in each cycle (40 from each cycle) according to Table 1.

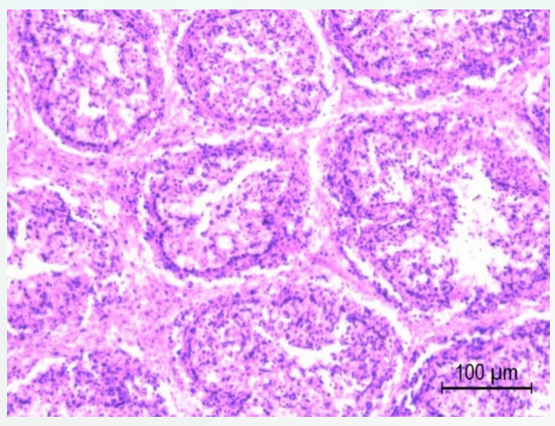
**Table 1.** Gumboro Vaccination and Bursa FTA Sampling

| Cycle | Gumboro Vaccine at 1 Day of Age | Age of Bursa Sampling (d) |
|---|---|---|
| 1 | Immune-complex (W2512) | 26-33 |
| 2 | MB-1 | 24-30 |

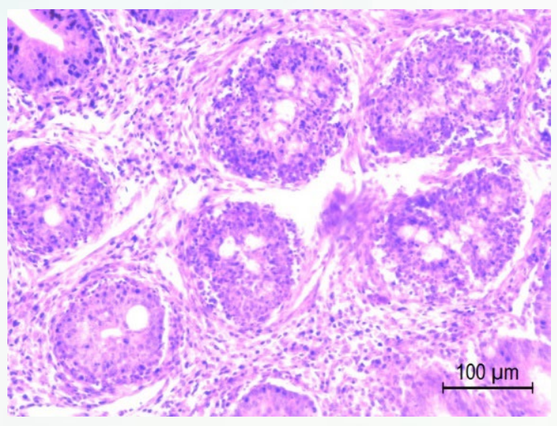
**Histopathology**

Tissue samples collected in both periods were sent to the Ministry of Agriculture and Forestry, Veterinary Control Central Research Institute, Ankara, Türkiye for H&E staining and histopathological examination. Lymphocytic depletion, cavitation and extensive necrosis were diagnosed as Gumboro field infection (Picture 1 & Picture 2).

**Picture 1**




**Picture 2**




**qPCR and Sequencing**

qPCR and sequencing methods were performed at the Clinic for Poultry and Fish Medicine, University of Veterinary Medicine, Vienna, Austria. qPCR was performed using a commercial kit. The 694 bp VP2 gene region of Gumboro virus was sequenced for strain identification and phylogenetic evaluation of positive samples.

**Results**

**Clinical observation:**

In the first cycle, at 4-5 weeks of age there were sick birds, mild bursal lesions.

In the 2nd cycle, the birds looked good with no pathological lesions.

**Histopathology Results**

In the 1st cycle, high level of damage was detected in 6 (75%) of 8 flocks vaccinated with the immune complex vaccine in the first production period, and mild degeneration was detected in two flocks (25%). In the 2nd cycle, there was no degeneration of the bursa (Table 2).

**qPCR and VP2 Sequencing**

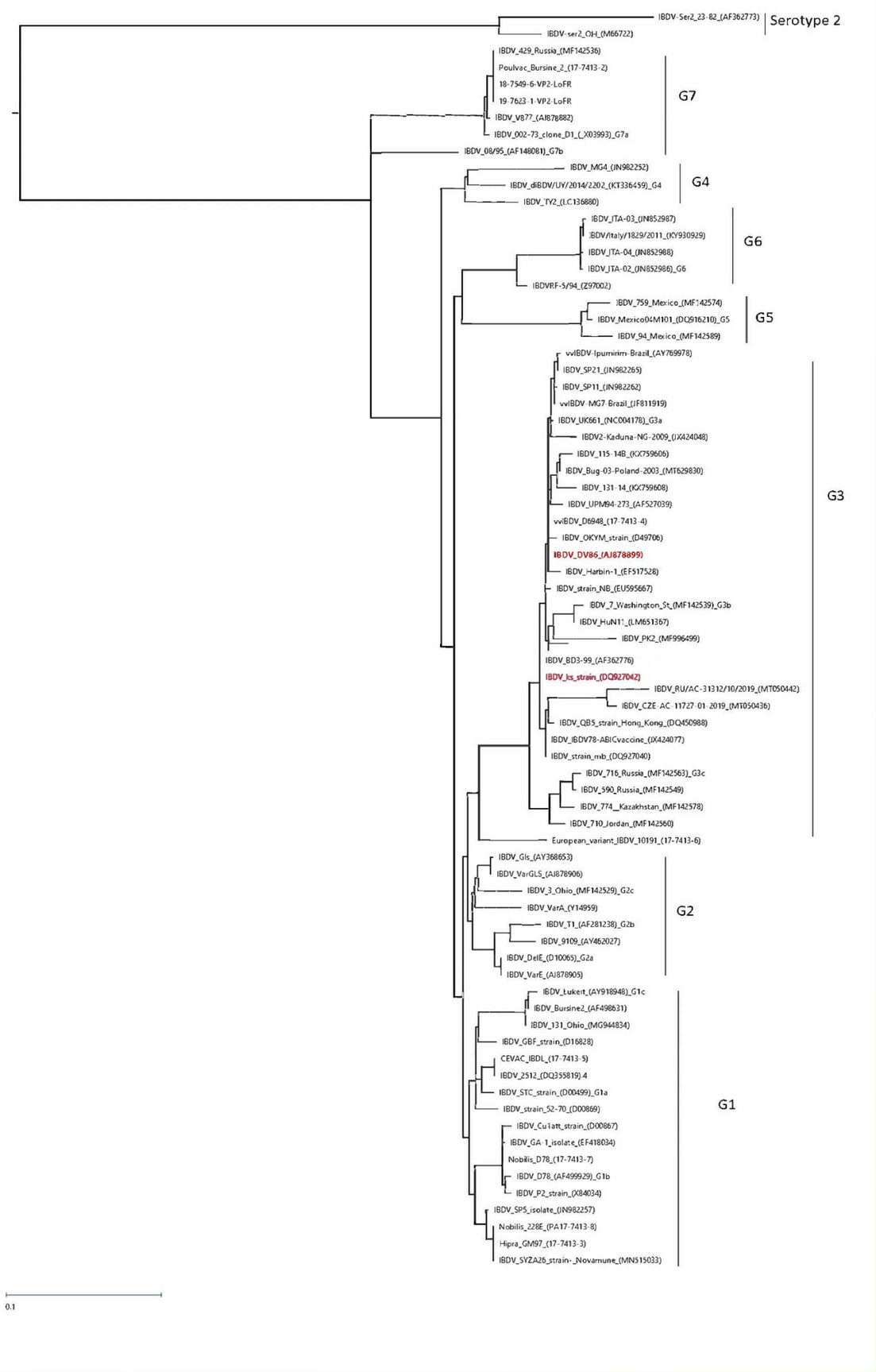
In the 1st cycle, field strains (KS & V86 Phylogenetic tree Figure 1) were found in 6 out of the 8 houses and vaccine strain W2512 was found only in 2 houses. In the 2nd cycle vaccine strain, MB was found in 7 houses, and in one house, there were not enough RNA for sequencing (Table 2).

**Table 2.** Histopathology (HP) and VP2 Gene Ssquencing Results.

| Poultry House | 1st Cycle Immune-complex Vaccine | | 2nd Cycle MB-1 Vaccine | |
|---|---|---|---|---|
| | VP2 Sequencing | HP* Result | VP2 sequencing | HP* Result |
| 1 | Very virulent ks strain | High degeneration | MB strain | No degeneration |
| 2 | Very virulent ks strain | High degeneration | MB strain | No degeneration |
| 3 | Very virulent ks strain | High degeneration | MB strain | No degeneration |
| 4 | Very virulent ks strain | High degeneration | MB strain | No degeneration |
| 5 | Very virulent ks strain | High degeneration | MB strain | No degeneration |
| 6 | Very virulent DV86 strain | High degeneration | NP | No degeneration |
| 7 | Winterfield 2512 strain | Mild degeneration | MB strain | No degeneration |
| 8 | Winterfield 2512 strain | Mild degeneration | MB strain | No degeneration |

*HP- Histopathology results

**Figure 1**




**Conclusion**

Field evaluation of Gumboro vaccine and protection is a challenging process. However, there are some clear parameters that can differentiate between protected and not protected flocks. One of the best ways to know if a certain vaccine is protective or not is by looking for IBDV in the bursa and bursa damage at about 4-5 weeks of age. In this field observation we found a definitive difference between 2 vaccines. 75% of the broilers in the immune complex vaccine cycle suffered mild clinical signs of high bursal damage, and their bursa was populated with a vvIBDV virus while there were no clinical signs and no bursal lesions and only MB vaccine strain observed in the broilers vaccinated with MB-1 in the 2nd cycle. This clearly shows that MB-1 vaccine provided a much better protection from vvIBDV field infection. The MB-1 vaccine not only demonstrated superior efficacy in preventing virulent strains of IBDV but also maintained the integrity of the immune system in broiler chickens, thereby enhancing overall flock health and productivity.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