

The Efficacy of the MB-1® Vaccine and Its Potential for Spread Among Broiler Flocks in the United Arab Emirates



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Introduction

Infectious Bursal Disease (IBD), commonly known as Gumboro disease, is a highly contagious viral infection that significantly impacts the poultry industry, particularly affecting young chickens aged 3 to 6 weeks. The disease is characterized by severe immunosuppression, leading to increased susceptibility to other infections and substantial economic losses (Dey et al., 2019; Hayajneh & Araj, 2023). Current vaccination strategies have included the use of conventional live vaccines, HVT vector vaccines and immune complex vaccines; however, recent studies suggest that the MB-1® vaccine may offer superior efficacy in protecting against IBD. The MB-1 vaccine is a live Gumboro disease virus vaccine containing the M.B. strain adapted for in-ovo or subcutaneous injection in the hatchery. It has been shown to elicit a quick and robust immune response, resulting in earlier and better protection. In this field study we compared the protection from IBD field infection between an immune complex and the MB-1 vaccines.

Material and methods:
Chickens and sampling

The field trial took place in a sixteen conventional broiler house farms located in the United Arab Emirates. Broilers in 10 houses were vaccinated with immune complex vaccine and samples were collected on days 26-33. The broilers in the other 6 houses were vaccinated with the MB-1 vaccine and samples were collected on days 27-29. Five FTA bursa samples and 5 bursa organs in formalin were collected from each house (Table 1).

Table 1: Gumboro Vaccination and Bursa Sampling

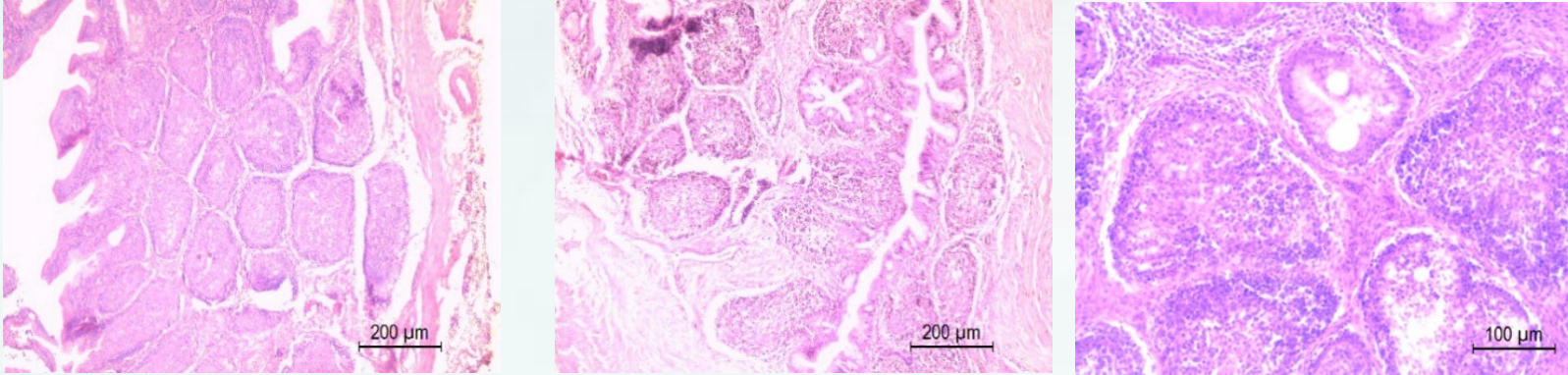
No of Houses	Gumboro Vaccine at 1 Day of Age	Age of Bursa Sampling (d)
10	Immune-complex (W2512)	26-33
6	MB-1	27-29

Histopathology

Tissue samples in formalin, 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 high damage typical of Gumboro field infection (Figure 1).

Figure 1: Negative and Positive Histopathology Results

Negative – no damage Positive -Lymphocytic depletion, cavitation, necrosis



qPCR and Sequencing

qPCR and sequencing 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 (Figure 2).

Results

Clinical observation:

At 4-5 weeks of age there were sick birds, mild bursal lesions in 7 out of the 10 houses vaccinated with immune complex vaccine. No clinical signs were observed in the MB-1 vaccinated broilers.

Histopathology results:

High level of damage was detected in the chickens of 7 (70%) out of the 10 houses vaccinated with the immune complex vaccine. There was no damage in the bursa of the broilers in the 6 houses vaccinated with the MB-1 vaccine (Table 2).

qPCR results:

Gumboro field strain, genotype 4 (G4) was found in the bursa of the broilers in 7 houses out of the 10 houses vaccinated with Immune complex vaccine and the M.B. strain was found in the other 3 houses. W2512, the Immune Complex vaccine strain was not detected in any of the bursas. The M.B. vaccine strain was found in the bursa of the broilers in 5 out of 6 houses vaccinated with the MB-1 vaccine. In one house, there was not enough genetic material for sequencing (Table 2).

Figure 2: Phylogenetic Tree

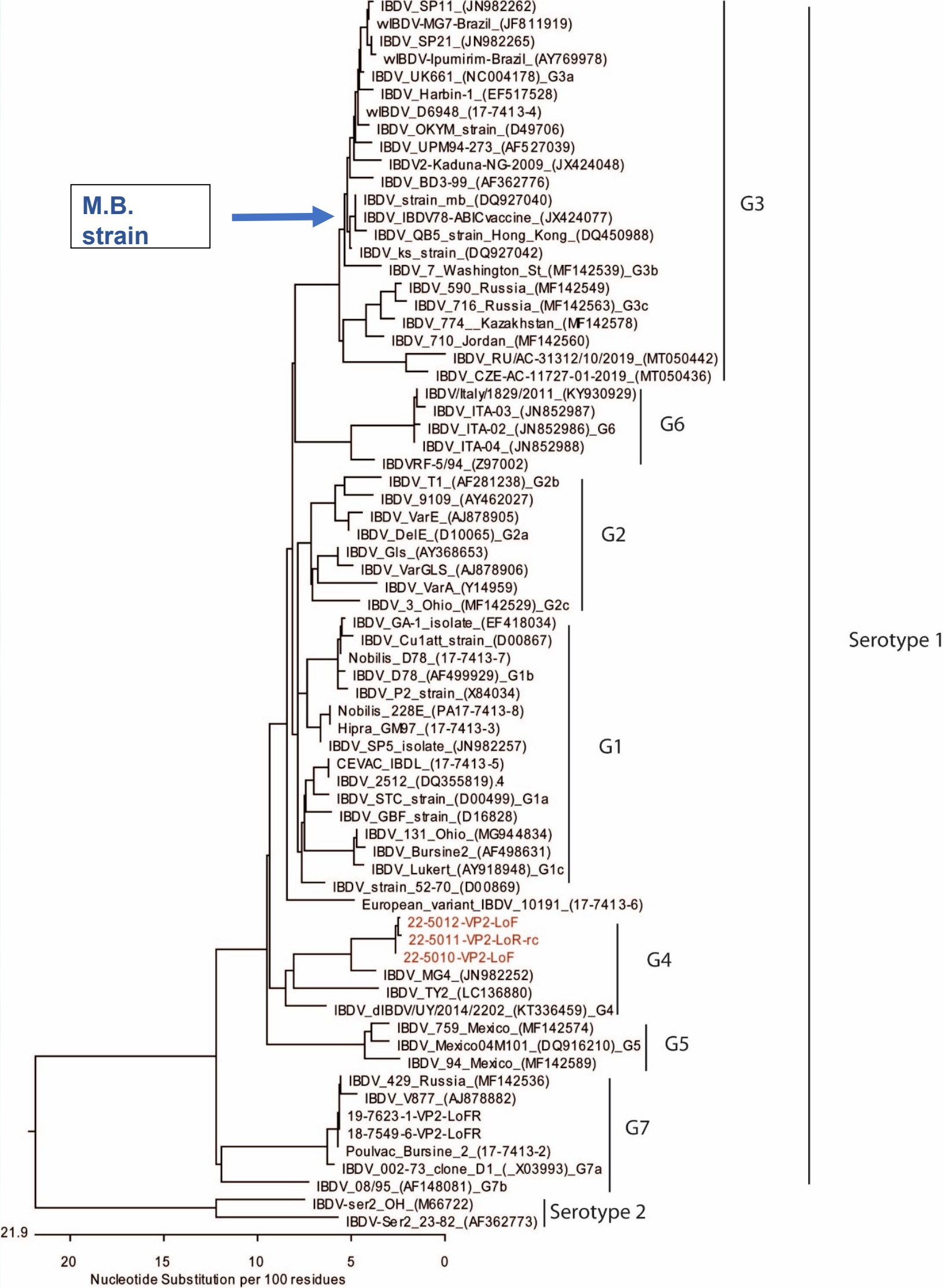


Table 2. Histopathology (HP) and VP2 Gene Sequencing Results.

Poultry House	Immune Complex Vaccinated Flocks		Poultry House	MB-1 vaccinated flocks	
	VP2 Sequencing	HP Result		VP2 sequencing	HP Result
1	vvIBDV G4 strain	High degradation	11	MB strain	No degradation
2	vvIBDV G4 strain	High degradation	12	MB strain	No degradation
3	vvIBDV G4 strain	High degradation	13	MB strain	No degradation
4	vvIBDV G4 strain	High degradation	14	MB strain	No degradation
5	vvIBDV G4 strain	High degradation	15	MB strain	No degradation
6	vvIBDV G4 strain	High degradation	16	NP	No degradation
7	vvIBDV G4 strain	High degradation			
8	MB strain	No degradation			
9	MB strain	No degradation			
10	MB strain	No degradation			

NP: Not performed due to insufficient nucleic acid amount.
HP- histopathology

Conclusion

- 1. Mild clinical signs, positive G4 field strain and high bursal histopathological damage was observed in the broilers of 7 out of 10 houses vaccinated with the immune-complex vaccine.
- 2. No clinical signs and no bursal histopathological damage were observed in the broilers vaccinated with the MB-1 vaccine. Only the MB-1 vaccine strain (M.B.) was detected in 3 flocks vaccinated with the immune-complex vaccine indicating that the MB-1 vaccine spread horizontally from the vaccinated flocks and was able to protect these houses from the G4 field infection.
- 3. No clinical signs and no histopathology damage were observed in the broilers vaccinated with the MB-1 vaccine. Only the MB-1 vaccine strain (M.B.) was observed in five out of the six vaccinated flocks (houses 11-15). In house 16, there were no clinical signs and no histopathology lesions. The positive Gumboro PCR was not typed due to the insufficient nucleic acid amount.
- 4. The findings of this study indicate that the immune complex vaccine did not provide sufficient protection against field infection with the G4 Gumboro disease virus strain in the broiler flocks on this farm.
- 5. The MB-1 vaccine conferred protection in all vaccinated houses and also spread and protected three out of the ten flocks vaccinated with the immune-complex vaccine.
- 6. These results highlight the superior protective potential of the MB-1 vaccine in broiler chickens.

