EFFICACY OF GUMBOHATCH® AGAINST AN EXPERIMENTAL CHALLENGE WITH INFECTIOUS BURSAL DISEASE VIRUS STRAIN UK2019 IN BROILERS

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Keywords: Gumboro, IBD, vaccine, variant, broiler

INTRODUCTION

Genome reassortment of the Infectious bursal disease virus (IBDV) contributes to the evolution and constant emergence of new strains. Hipra's diagnostic services have repeatedly identified the VP2 sequence of a new strain in several EU countries, which has been named UnitedKingdom.2019 (UK2019). The phylogenetic analysis of the complete genome of the strain indicates that this virus is a reassortment of segment A of a very virulent virus (G3 genotype) with segment B of a classic virus (G1 genotype). Pathogenic studies in our laboratory showed moderate inflammation of the bursa but no external oedema or clinical signs. This strain would be linked to subclinical outbreaks of IBD on farms in this area, suggesting a possible lack of efficacy of the control programmes used for this disease. These outbreaks would be characterized by immunosuppressive signs sometimes linked to poor overall performance or an increase in unwanted parameters such as rejections at slaughter and bursal atrophy. An efficacy trial was performed in order to assess whether GUMBOHATCH®, an immune complex vaccine against IBDV, would protect chickens from a UK2019 challenge.

MATERIALS AND METHODS

Animals: 70 broilers with anti-IBD maternally derived antibodies (MDA).
Vaccination: at 1 day of age, subcutaneously, with a standard dose of GUMBOHATCH® vaccine.
Challenge: at 28 days of age, by the oculo-nasal route, with UK2019 strain, isolated from bursa of Fabricius (BF) samples obtained from a farm in the UK with a history of subclinical outbreaks of IBD.
Study Design (Table 1): At day 0, the animals were distributed into groups and vaccinated. At day 28, necropsies were performed in order to monitor the vaccine strain replication. Ten animals from each group A and B were challenged, and the rest remained unchallenged. Five days later (day 33) all the birds were euthanized and necropsied.

GROUP	N	DAY 0	DAY 28	DAY 33
VAC	5	GUMBOHATCH®	Necropsy	-
VAC/CH	10		Challenge	Necropsy
VAC/ NO CH	10		-	Necropsy
NO VAC	5	MOCK-vaccination	Necropsy	-
NO VAC/CH	10		Challenge	Necropsy
NO VAC/NO CH	10		-	Necropsy
Batch control	20	Blood sampling	-	-

Table 1. Study design.

Evaluated parameters:
- Clinical signs (day 0 to day 33).
- Serum (days 0 and 28) was analysed by ELISA for IBD antibody quantification (CIVTEST AVI IBD).
- Necropsies (days 28 and 33):
  - o Lesion evaluation of the bursa of Fabricius (BF) and spleen.
  - o Body weight (BW) and growth rate.
  - o BF:BW and Spleen:BW ratios.
  - o Histopathological analysis (BF).

RESULTS

Serology

The presence of MDA at the time of vaccination was confirmed. In unvaccinated animals, the MDA fell from day 0 to day 28. In contrast, the vaccinated birds seroconverted and reached high titres at day 28 (Figure 1).

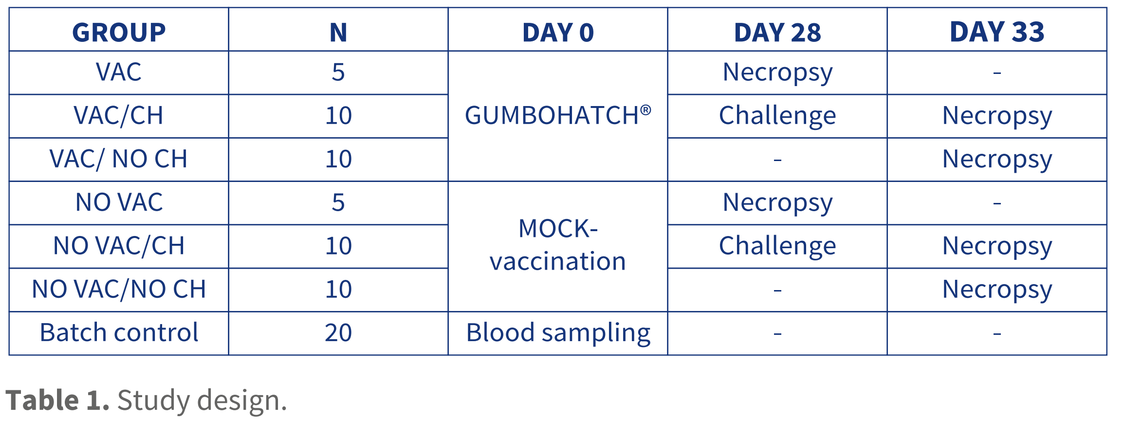

Fig. 1. Serology at day 0 and day 28.

Bursa:Body weight ratio and macroscopic lesions.

Before the challenge (day 28), the vaccinated birds showed a reduction in the BF:BW ratio in comparison to unvaccinated birds, compatible with bursal atrophy, as expected in live-vaccinated birds. After challenge, the BF:BW ratio was maintained in both vaccinated groups (challenged or not challenged), but no other lesions were observed. In contrast, the unvaccinated challenged group showed a reduction in the BF:BW ratio in comparison to their unchallenged control (NO VAC/NO CH), in addition to presenting bursas with signs of mild acute inflammation in 100% of the birds (Figure 2).

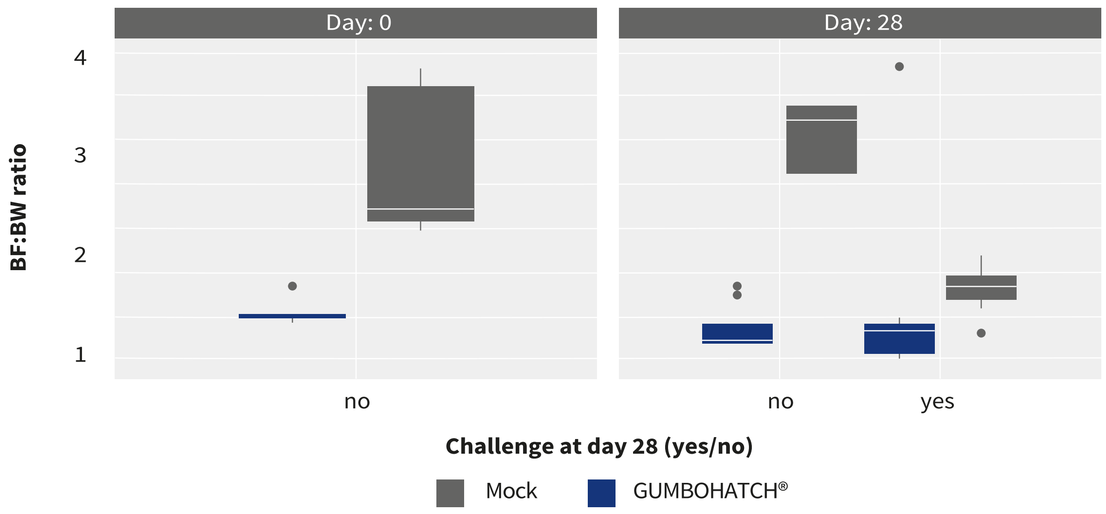

Fig. 2. Bursa:Body weight ratios.

Bursa histopathology after challenge (day 33)

The bursas in the NO VAC/CH group showed mild to moderate inflammation (cellular infiltration and oedema), significantly higher than that in the VAC/CH group (very mild or negligible). Moderate lymphoid depletion was observed in the VAC/CH birds, as expected as a consequence of the vaccine virus replication. In contrast, the lymphoid depletion in the NO VAC/CH group was severe (Table 2).

LESION SCORE from 0 (absence) to 5 (severe)	GUMBOHATCH®	NOT VACCINATED	*p value*
Lymphoid depletion	3.10	4.8	<0.05
Heterophil infiltration	0.10	1.10	<0.05
Mononuclear infiltration	1.10	2.20	<0.05
Plical oedema	0.10	2.70	<0.05
Oedema of muscular wall	0.00	1.90	<0.05
Serosal oedema	0.00	1.30	<0.05
Lymphoid necrosis	0.60	2.30	<0.05
Plical atrophy	0.50	1.80	<0.05
Cystic degeneration	3.10	3.70	<0.05

Table 2. Bursa histopathology

Spleen-body weight ratio and growth rate

Unlike the VAC/CH group, the NO VAC/CH group showed a significant increase in the Spleen:BW ratio compared to their unchallenged controls, compatible with splenomegaly (Figure 3). No effect of the vaccine or the challenge was observed on the growth rate.

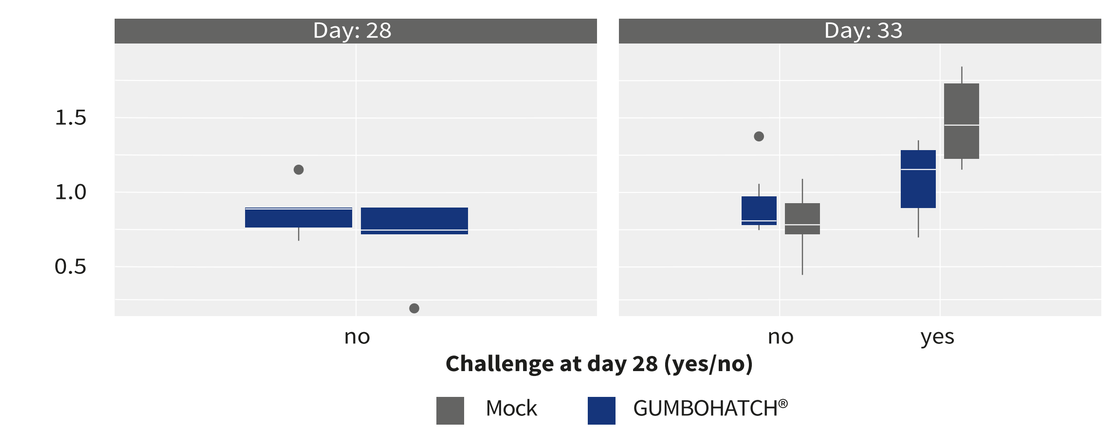

Fig. 3. Spleen:Body weigh ratios.

DISCUSSION AND CONCLUSIONS

The clinical outcome and lesions caused by the UK2019 strain were milder than those expected in very virulent strains. This corresponds to the literature regarding this type of reassortant strain and previous pathogenicity studies performed with this strain. At the end, the effects of the challenge were those expected for a reassortant strain, and the results demonstrated that GUMBOHATCH® protected the birds from the challenge, in terms of the lesions analysed in the bursa of Fabricius and spleen.

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