EFFICACY OF DIFFERENT VACCINATION PROGRAMMES INCLUDING IMMUNE COMPLEX IBD VACCINES AGAINST VERY VIRULENT IBDV CHALLENGE IN BROILER CHICKENS

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INTRODUCTION

It is known that maternally derived antibodies (MDA) are a pivotal factor to be considered in the design of infectious bursal disease (IBD) vaccination programmes. A lack of synchrony between proper MDA levels and vaccine administration could jeopardize the immunization plan. Immune complex vaccines are specifically designed to ensure this coordination, guaranteeing a timely start of the replication of the vaccine antigens based on MDA levels. GUMBOHATCH® is a next-generation immune complex vaccine against IBDV with a different formulation (IgY of egg origin) and control parameters to ensure the complete coating of the vaccine virus and the maintenance of maximum potency, even in the presence of high levels of maternal antibodies (MDAs), whilst avoiding the risk of immunosuppression. The aim of this trial was to determine the protective efficacy of GUMBOHATCH® vs standard-formulated immune complex vaccines against a challenge infection with a very virulent IBDV (vvIBDV) strain in broiler chickens.

MATERIALS AND METHODS

Experimental design

Day-old broiler chickens with MDA against IBDV (3,809+1,672.35 ELISA titre, Synbiotics) were randomly allocated into 4 groups (G). G1 was vaccinated subcutaneously (SC) with GUMBOHATCH® (HIPRA) at 1 day of age; G2 and G3 received two different commercially available immune complex vaccines by the SC route at 1 day of age. G4 did not receive any vaccine (control group). G1-4 groups were split into 2 subgroups of 15 birds each and one subgroup of 13 birds. The first two subgroups were challenged at either 28 or 35 days with a very virulent strain (vvIBDV) by oral drop (105 EID50). The third subgroup was not challenged and used to check the outcome of vaccination (Table 1).

Group	Subgroup	Treatment	N° of animals	Challenge day
G1	G1A	GUMBOHATCH® (1052)	15	28
	G1B		15	35
	G1C		13	Unchallenged
G2	G2A	Immune complex 2 (W2512)	15	28
	G2B		15	35
	G2C		13	Unchallenged
G3	G3A	Immune complex 3 (V877)	15	28
	G3B		15	35
	G3C		13	Unchallenged
G4	G4A	Non-vaccinated	15	28
	G4B		15	35
	G4C		13	Unchallenged

Table 1. Experimental design

Evaluated parameters

Clinical signs and mortality were monitored throughout the study and up to 4 days post infection. Chickens were periodically humanely killed to evaluate the bursa of Fabricius (B/BW, macroscopic lesions and lymphocyte depletion). Bursa samples were fixed in 10% neutral buffered formalin to evaluate the lymphocyte depletion, which was scored following the guidelines outlined in the European Pharmacopoeia. Blood samples were collected periodically to evaluate the antibody immune response against IBDV by ELISA (Synbiotics).
Bursa to body weight ratios (B/BW) and antibody titres were analysed and compared between groups using ANOVA and least significant difference (LSD) test. Histopathological lesion scores of bursae were compared between groups using the Kruskal-Wallis test. Differences between groups were considered significant at $p<0.05$.

RESULTS

Vaccination of groups 1-3 produced atrophy of the bursa and an antibody immune response against IBDV (Fig. 1 & Fig. 2). This indicated that the vaccines replicated and generated an immune response in the birds. Notably, atrophy and IBDV antibodies in G1 were first detected at 18 days, whereas in the other groups it occurred from 28 days.

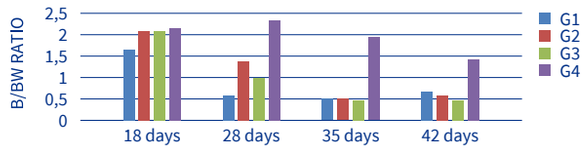

Figure 1. B/BW RATIOS in non-challenged groups.

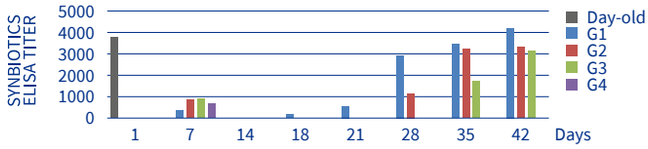

Figure 2. Serological responses in non-challenged groups.

The challenge infection with vvIBDV produced atrophy, oedema and lymphocyte depletion in the bursa of Fabricius of G4 at both time points. Oedematous macroscopic lesions were also observed in the challenged group G3 at 28 days (Fig. 3).

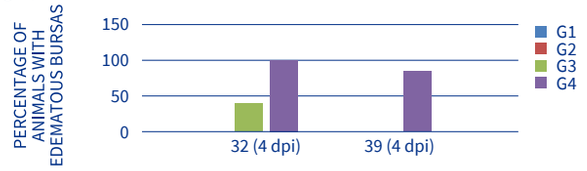

Figure 3. Percentage of oedematous bursas 4 days after vvIBDV challenge.

Histopathological lesion score was reduced in all vaccinated groups compared to G4 (4.47-4.67 average score) though to a lesser extent in G3 after the challenge at 28 days (3.73 score)(Fig. 4).

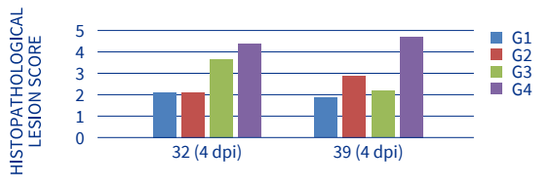

Figure 4. Histopathological lesion score in challenged groups.

DISCUSSION AND CONCLUSIONS

GUMBOHATCH® proved to be the vaccine which provided the earliest immunization vs standard-formulated immune complex without compromising chicken health. Moreover, it was shown to provide effective protection against the vvIBDV strain. Therefore, this study suggested that this vaccine is a safe and reliable solution for the control of IBD and for immunization of birds on farms with an early risk of disease.