KINETICS OF THE ANTIBODY RESPONSE TO VACCINATION WITH AN IMMUNE COMPLEX IBD VACCINE IN BROILERS USING A COMMERCIAL ELISA

CINÉTICA DE LA RESPUESTA INMUNE A LA VACUNACIÓN CON UNA VACUNA CONTRA EL COMPLEJO INMUNE IBD EN POLLOS DE ENGORDA UTILIZANDO UN ELISA COMERCIAL

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RESUMEN

Observaciones de la cinética de la respuesta inmune a la Enfermedad Infecciosa de la Bolsa (IBD) en 2972 parvadas saludables de pollos de engorda vacunadas con una vacuna contra el complejo inmune IBD al día de edad durante un periodo de 4,5 años (Febrero/2009 a Julio/2013), y criadas en diferentes regiones del mundo, fueron evaluadas para la respuesta de anticuerpos a diferentes edades de procesamiento (de 25 a 60 d de vida) utilizando un kit comercial de ELISA.

Las parvadas vacunadas se convirtieron gradualmente en serológicamente positivas después de 26 d de vida lo cual refleja el momento en que el virus de la vacuna llegó a la bolsa de Fabricio. A partir de los 38 d en adelante casi todas las parvadas vacunadas fueron positivas.

El porcentaje de parvadas serológicamente positivas sacrificadas a edades que varían de 40 a 60 d fue de 98.4% y la presencia de la cepa de la vacuna (W2512) se confirmó al azar por RT-PCR.

SUMMARY

Observations of the kinetics of the immune response to infectious bursal disease (IBD) in 2972 healthy commercial broiler flocks vaccinated with an immune-complex IBD vaccine at day of age during a four and a half year period (February/2009 to July/2013), and raised in different regions of the world, was assessed for antibody response at different processing ages (Ranging from 25 to 60 d of life) using a commercial ELISA test kit. The vaccinated flocks gradually turned serologically positive after 26 d of age reflecting the timing when the vaccine virus reached the bursa of Fabricius. From around 38 d onwards, nearly all vaccinated flocks were positive. The percentage of serologically positive flocks slaughtered at ages varying from 40 to 60 d was 98.4% and the presence of the vaccine strain (W2512) was randomly confirmed by RT-PCR.

INTRODUCTION

Infectious bursal disease (IBD) is a disease of chickens caused by an Avibirnavirus. From its first description in the early 60’s, the disease spread out to almost all chicken producing countries in the world and it still remains as one of the major concerns for producers.

Its prevention basically depends on the association of biosecurity and vaccination. The introduction of IBD vaccines that can be injected through in ovo or subcutaneous routes in the hatcheries has greatly changed the vaccination procedures all over the world.

This article summarizes a study conducted over a period of four and a half years in which the kinetics of the antibody response to IBD was assessed in nearly 3,000 commercial broiler flocks vaccinated with an Immune Complex IBD vaccine in the hatcheries.

MATERIALS AND METHODS

Flocks. Two thousand nine hundred and seventy two clinically healthy broiler flocks raised in different countries (Spain, Turkey, Malaysia, France, Romania, Ukraine, and Egypt) and under various conditions were included in this study which was carried out from February/2009 to July/2013.
**Vaccine.** All flocks included in this study were vaccinated against Gumboro Disease only with an Immune Complex IBD vaccine either through *in ovo* or subcutaneous route of injection in the hatcheries. This vaccine contains the intermediate plus Winterfield 2512 strain of IBD live virus in complex with specific IBD immunoglobulins.

**Serology.** Serum samples were taken at the depletion time which varied from 25 to 60 d of age and assessed for antibody response using a commercial ELISA test kit. The results were expressed as Arithmetic Mean titers (AMT) and the cut-off value used was according to the manufacturer's recommendation (≥ 391). Flocks with AMT above this value were considered positive.

**Vaccine take.** Bursa samples from randomly chosen flocks were sent to the laboratory for detection and characterization of the IBDV. The sequence was based on the 408 base pairs long (721-1128 bp) nucleotide sequence of the hypervariable region of the vp2 gene of IBDV.

**RESULTS**

The vaccinated flocks started to become serologically positive at the end of the fourth wk of age. The percentage of positive flocks steadily increased and, from around 38 days onwards, nearly all vaccinated flocks were positive by the commercial ELISA test. Graphic 1 shows the kinetics of the antibody response to vaccination with an Immune Complex IBD vaccine expressed as Positive/Negative ratio per age.

In order to assess which IBD virus (field or vaccine) induced the active immunity, bursa samples from randomly selected flocks from each country were sent to the same laboratory for detection and further characterization of the IBDV. In all flocks evaluated by these methods, the W2512 vaccine strain was detected in the bursa samples.

**DISCUSSION**

This large scale serological assessment of broiler flocks vaccinated with an Immune Complex IBD vaccine demonstrates that the active antibody response starts to be detected by a commercial ELISA test between four and five wk of age and there is a gradual and steady increase of the percentage of positive flocks as they get older. Nearly all vaccinated flocks were positive from around 38 d onwards.

These results are in agreement with Palya *et al.* (3) and Herczeg *et al.* (1) who demonstrated that, in controlled conditions, an active immune response detected by virus neutralization was evidenced from three to four wk of age onwards. Laboute *et al.* (2) working under field conditions, also detected active immune response by a commercial ELISA test between three to four wk of age. In fact, the gradual increase in the percentage of positive flocks occurs due to the mechanism of action of the Immune Complex IBD vaccine. The vaccine viruses which are complexed with the specific immunoglobulins are protected against neutralization by maternally derived antibodies anti-IBDV (MDA<sub>IBD</sub>). However, these exogenous antibodies are progressively catabolized during the first wk of life and the vaccine viruses progressively released. Immunization will occur when the level of the MDA<sub>IBD</sub> has reached a level that is low enough to permit the vaccine to reach the bursa and start replicating. This process occurs in every chicken so that replication starts at the optimum time in an individual manner.

Palya *et al.* (3) demonstrated that flocks with lower maternal antibody titer to IBDV at hatch have an earlier antibody response than birds with higher maternal antibodies to IBDV at hatch.

From all flocks included in this study, 1,770 of them were slaughtered with ages varying from 40 to 60 d of age. At this age, the vaccine virus (W2512) from the Immune Complex vaccine would have already reached the bursa of Fabricius and induced measurable levels of antibodies by ELISA test irrespective of the level of passive immunity anti-IBDV at hatch. Among these 1,770 flocks, no positive antibody titers were detected in only 25 of them, i.e., 1.6% of the total. The reasons might be related to poor vaccine application, problems in the cold chain, poor sampling technique, bad management of the assay, etc.

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REFERENCES


Graphic 1. Kinetics of the immune response to vaccination with an ICx IBD vaccine.