

# The Effect of *In Ovo* IBDV Vaccination when Administered in Maternal Antibody Positive & Negative Chickens.

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## Abstract

Many questions have always surrounded the benefits of day of age *in ovo* IBD vaccine in chicks with maternal antibodies. The purpose of this study was to determine if *in ovo* IBD vaccine in the face of maternal antibodies makes it to the bursa, and if so does it prevent or delay the onset of field infection? The results of RT/PCR-RFLP and histopathology are presented and discussed.

## Introduction

Hyperimmunization of broiler breeders against IBD is a common practice amongst U.S. broiler integrators. Intensive breeder vaccination programs are designed to maximize the maternal antibody titers of the progeny, protecting broiler flocks from the immunosuppressive effects of early subclinical IBD infection. Integrators have questioned the effectiveness of day-of-age or *in-ovo* IBD vaccination in high-titered progeny, and many have abandoned the practice based upon the supposition that maternal antibodies would neutralize vaccine virus before it could be of benefit.

This study examines the effects of *in-ovo* IBD vaccination in broilers with high maternal antibody (MA) titers. The study was conducted in three parts designed to answer these key questions: Does the vaccine reach the bursa in the face of IBD maternal antibodies? If it does reach the bursa, what effect does it have on the bursa? Does *in-ovo* IBD vaccination prevent or delay the onset of field infection?

## Materials and Methods

### Part 1

Seventy eggs with maternal antibodies to IBD were obtained from a commercial broiler integrator. Seventy SPF eggs served as antibody-free controls. Both the maternal antibody (MA)-positive and MA-negative eggs were injected at 18 days of incubation with a full dose of an intermediate classic strain IBD vaccine (Univax®-IBD, Schering-Plough Corporation). The eggs were hatched and the hatchlings were grown in isolation units through 20 days of age.

Five birds were sacrificed from each group daily beginning 1 day post-hatch. Bursas were harvested and half of each bursa was submitted for IDEXX RT/PCR RFLP to determine the presence or absence of the vaccine virus in the tissue.

### Part 2

The second half of each bursa harvested for IDEXX RT/PCR RFLP in Part 1 above was submitted for histological examination. Samples were collected from 5 birds daily from day 1 through day 20 post-hatch.

### Part 3

One hundred forty-five (145) eggs with maternal antibodies to IBD (Average ELISA Titer of 11,000) were obtained from a commercial broiler integrator. One hundred (100) eggs were injected at 18 days of incubation with a full dose of an intermediate classic strain IBD vaccine (Univax®-IBD, Schering-Plough Corporation). Forty-five (45) eggs served as unvaccinated, MA-positive controls.

At hatch, the vaccinated and unvaccinated groups of eggs were each subdivided into two groups of 50 chicks. One of these two groups was to be challenged orally with the standard dose of the USDA Standard Strain IBD virus and the other group was to be challenged orally with a standard dose of the USDA Delaware E Strain IBD virus.

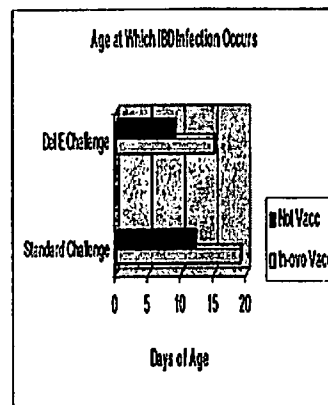


Fig. 1- Bursas from antibody-positive broiler chickens given either Univax-IBD *in ovo* (left) or no vaccine (right), and then challenged with IBDV after hatching.

The birds from each group were grown in isolation units through 20 days of age. In addition to the 4 test groups, one group of 42 unvaccinated, MA-positive birds remained in a separate isolation unit to serve as unchallenged controls.

All groups, except the unchallenged controls, were challenged orally at day 2, 4, 6, 8, 12, 14, 16 and 18 post-hatch with their assigned challenge viruses. Three bursas were harvested from each challenged group five days after each sequential challenge. Two bursas were also harvested from the unchallenged control birds every day.

## Results

### Part 1

IBD virus was detected in both the maternal-antibody (MA) negative and the MA-positive groups by IDEXX RT/PCR RFLP. Virus was detected in the MA-positive birds beginning at 3 days of age, and was detectable through 9 days of age. The test results showed a weak positive IBD at 9 days of age, and were negative by 11 days of age.

Virus was detected in the MA-negative birds beginning at 5 days of age, and was still a strong positive at 9 days of age. No further testing was completed after 9 days of age.

### Part 2

On histopathology the bursas from MA-positive birds demonstrated variation in follicle size (Score 3.2) beginning at 8 days of age. By 16 days of age, follicles had returned to normal (Score 1.6).

The bursas from MA-negative birds showed acute follicle necrosis consistent with IBD by 2 days of age (Score 4.0). At 10 days of age, the bursas showed signs of chronic IBD infection with some regeneration (Score 3.6).

### Part 3

Delaware E strain IBD virus was detected by IDEXX RT/PCR RFLP in the non-vaccinated, maternal antibody-positive chicks beginning at 9 days of age. The average histopathology score for the Delaware E challenged group was 2.9. The standard strain IBD virus was detected at 12 days of age, with an average histopathology score of 1.2.

The Delaware E strain IBD virus was not detected via IDEXX RT/PCR RFLP in the vaccinated, maternal-antibody positive birds until 15 days of age. The average histopathology score for this group was 1.7. The standard strain IBD virus was not detected until 19 days of age, with an average histopathology score of 1.5.

## Summary

This study demonstrates that, while there are some differences in the way that maternal antibody positive chicks and maternal antibody negative chicks respond to *in-ovo* IBD vaccination, the maternal antibody positive chicks do respond to *in-ovo* IBD vaccination with measurable benefit. Despite maternal antibody, transient vaccine virus is detected in the bursa of vaccinated chicks from days 3 through 9, followed by histological changes in the bursa follicle size only from days 8 through 16. The follicles recovered completely by 16 days of age.

Sequential challenges of both vaccinated and non-vaccinated chicks with IBD maternal antibody demonstrated that the Delaware E variant strain could be detected in the bursas of both groups at a younger age than the standard IBD strain. The Delaware E strain was detected in *in-ovo* vaccinated chicks at 15 days of age, 6 days later than in the non-vaccinated chicks. The standard IBD strain was detected in the *in-ovo* vaccinated chicks at 19 days of age, 7 days later than in the non-vaccinated chicks. *In-ovo* vaccination of maternal antibody positive chicks appeared to delay the age at which virus could be detected in the bursa by approximately one week.

Previous research has demonstrated that the severity of immunosuppression associated with subclinical IBD increases with earlier challenge. In the face of constant field challenge, a delay of bursal infection for approximately one week should significantly improve the immunocompetence of the flock.