

ISSN 1682-8356  
ansinet.org/ijps



INTERNATIONAL JOURNAL OF  
**POULTRY SCIENCE**

**ANSI***net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan  
Mob: +92 300 3008585, Fax: +92 41 8815544  
E-mail: editorijps@gmail.com

## Vaccination Against Infectious Bursal Disease Virus (IBDV) in Broiler Birds in Mozambique: Are We Doing Enough?

E.F. Muchanga<sup>1</sup>, E.R.C. Frechaut<sup>1</sup>, P. Taunde<sup>1</sup>, O. Nhambirre<sup>2</sup>, A.M. Junior<sup>1</sup> and C.G. Bila<sup>1</sup>  
<sup>1</sup>Faculdade de Veterinária, <sup>2</sup>Centro de Biotecnologia,  
Universidade Eduardo Mondlane, Av. De Mocambique Km 1.5, Maputo-Mozambique

**Abstract:** Although regularly vaccinated, IBD outbreaks are frequently reported in broiler birds in Mozambique, which may suggest poor immunization. To test this hypothesis, this study aimed to detect maternally derived antibodies titers in commercial unvaccinated 1-d-old chicks and to evaluate humoral immune status of vaccinated adult chicken broilers against IBD virus from Matola and Maputo regions. Serum samples were collected from unvaccinated broiler day-old chicks (n = 250) and vaccinated adult broiler chicken (n = 300). A commercial ELISA kit was used to determine the titer of mAb. Our results revealed that one day old chicks presented high protective antibodies titers and good and low coefficient of variation (CV), which indicated optimal maternal immunity transfer. Only 28% of adult broiler serum samples had protective antibody titers and more than 1/3 were seronegative. In addition, as little as 27% of analyzed flocks were considered protected against IBD virus. Taken together, this data suggest that, unlike what has been found in 1-d-old chicks, the evaluated adult broiler poultry population were susceptible to IBDV, which may explain the frequently outbreaks reported in those regions.

**Key words:** Broilers, infectious bursal disease virus, vaccination, serology, Mozambique

### INTRODUCTION

Infectious bursal disease (IBD) is an acute, highly contagious viral disease, which mostly infects young chickens between 3 to 6 weeks of age, although has been reported in chickens of 2-15 weeks of age (Allan *et al.*, 1972). The etiologic agent, infectious bursal disease virus (IBDV), is a double stranded naked RNA virus that belongs to the genus Birna under the family *Birnaviridae*. IBDV is non-enveloped, icosahedral shaped with a diameter of 55-65 nm (Hirai *et al.*, 1974). IBD is an economically important disease in poultry worldwide (Van Den Berg, 2000). Mortality, immunosuppression due to destruction of B cells and macrophages and decreased economic performance are characteristics of the disease (Sharma *et al.*, 2000; Van Den Berg, 2000). Passive immunological protection, hygiene and vaccination on the broiler farm with live attenuated vaccines are the important strategies for prevention and control of IBD (Fussell, 1998; Flensburg *et al.*, 2002).

Although broilers are regularly vaccinated, outbreaks of IBD are frequently reported countrywide (MINAG, 2012). We hypothesize that this might be due, among other reasons, to poor vaccination of the birds. In reality, the type of vaccines used and vaccination protocols differ between different farmers. While studying humoral immunity profile through serologic evaluation has been shown as important tool to evaluate vaccination programs (Brentano *et al.*, 2000), this technical instrument is infrequently applied in Mozambique.

The present research was undertaken with two approaches: to detect maternally derived antibodies titers in commercial unvaccinated 1-d-old chicks and evaluate humoral immune status of vaccinated adult chicken broilers against IBDV.

### MATERIALS AND METHODS

**1-d-old chicks:** A total number of 250 samples were collected from non-vaccinated 1-d-old Cobb500 or Ross breed chicks purchased from 5 local commercial hatcheries (A, B, C, D and E).

**Adult chicken broilers:** Three hundred IBD vaccinated adult broiler chicken blood samples were collected from 30 flocks. The birds were of age between 30 to 40 days and were vaccinated once against IBV at age between 14 and 18 days, according to Mozambican Poultry Vaccination Program.

**Serologic analysis:** Serum was separated from blood samples by centrifugation at 15,000 x g for 3 min and stored at -80°C until the day of analysis. Commercial ELISA kit (Synbiotics Co., San Diego, CA) was used to determine the titer of mAb (IgG/IgY) against IBDV. The ELISA kit was used according to manufacturer's protocol using an automated microplate reader (EL x 800, BIO-TEK Instruments Inc., Winooski, VT). The geometric mean titer (GMT) in each individual sample was also calculated according to manufacturer's instructions. All serum samples were read against positive and negative

Table 1: Maximum and minimum GMTs, CVs and protection rates in 1-d-old chicks from analyzed hatcheries

Hatchery	GMT (minimum and maximum)	CV (%)	Protection rate (%)
A	20940-22931	2.6	100
B	22382-23509	1.6	100
C	871-22056	43.3	90
D	8954-22356	21.2	100
E	20102-22440	3.5	100

Table 2: Proportion of protected or unprotected flocks, GMTs and CVs from analyzed adult broiler flocks

	Flocks	GMTs (minimum-maximum)	GMTs (medium)	CV (minimum-maximum)	CV (medium)
Protected flocks	27% (8)	3241-16099	5447	13-26	19
Unprotected flocks	73% (22)	0-2145	554	32-300	122

control antisera provided by the kit and used in each run. Individuals with GMTs  $\geq 2500$  were considered immune against IBD (da Silva, 2012). Similarly, flocks with coefficient of variation (CV) of 45 or less and at least 30% of immune individuals were considered adequately protected (Giambone *et al.*, 1999; da Silva *et al.*, 2012).

## RESULTS

Table 1 summarizes the GMTs, CVs for mAb against IBDV in unvaccinated broiler chicks from 5 local hatcheries. The GMTs obtained reached the protection level and varied slightly among hatcheries analyzed and ranged from 871 to 23509. The CVs varied from Good ( $CV \leq 45$ ) to excellent ( $CV \leq 30$ ).

The ELISA results in vaccinated adult broiler chickens from 30 flocks demonstrated that only 28% of analyzed samples had protective antibody titers ( $GMT \geq 2500$ ) and more than 1/3 had not antibody titers at all ( $GMT = 0$ ) (data not shown). In line with these findings, only 27% of analyzed flocks were considered successfully vaccinated and its CVs varied from 13 to 26% (Table 2).

## DISCUSSION

Maternal derived antibodies or passive immunity are the naturally transfer of immunoglobulin from one individual to another. In poultry, maternal antibodies are passed from hyper-immunized or naturally infected breeder hens to the progeny through the egg. This passive immunity aims to protect young chicks during a period when their immune system is not fully developed to proper react to an early challenge and has relatively short duration, commonly 2 weeks. Analyzed day-old serum samples from local hatcheries have shown high and protective GMTs and low and excellent CVs, which mean that there was adequate and uniform transfer of antibodies from the breeder hens (da Silva *et al.*, 2012; Besseboua *et al.*, 2015).

To evaluate and adjust vaccination programs in poultry industry, monitoring serologic antibodies against diseases is a useful instrument (Brentano *et al.*, 2000). Our study found that only 27% of adult broiler flocks were successfully vaccinated against IBDV and more than 1/3 of serum samples had not antibody titers at all ( $GMT = 0$ ) (data not shown). Additionally, the overall

population with protective antibody titers against IBDV in the study regions was only 28%, which may mean that, according to epidemic theory, the vaccinated broiler bird population in studied regions was not protected. According to that theory, if 70% of the population is immune, the disease outbreak is unlikely to occur because there are not enough susceptible individuals to propagate an epidemic (Thrusfield, 1995; Young *et al.*, 2002).

Inadequate vaccination against avian diseases is a common problem in developing countries, where unskilled small poultry farmers dominate the poultry industry and they receive very little input from veterinarians and other relevant technicians. Poor manufacturing practices of vaccine standards, lack of adequate storage facilities, application of expired vaccines and inadequate vaccine handling during transportation and continuous treatment with antibiotics during vaccination have been reported as the possible causes for the vaccine failure in those countries (Tariq, 1999; Sil *et al.*, 2002; Vui *et al.*, 2002). The identification of precise causes of vaccination failure against IBDV in Mozambique needs to be investigated.

**Conclusion and suggestion:** Our results suggest that adult broiler birds analyzed were susceptible to IBDV, which may explain the frequently reported outbreaks throughout the country. The obtained results reinforce the need of efficient immunization programs to avoid losses related to IBD outbreaks.

## REFERENCES

- Allan, W.H., J.H. Faragher and G.A. Cullen, 1972. Immunosuppression of infectious bursal agent in chicks immunized against Newcastle disease. *Vet. Rec.*, 90: 511-512.
- Besseboua, O., A. Avad and H. Benbarek, 2015. Determination of the optimal time of vaccination against infectious bursal disease virus (Gumboro) in Algeria. *Onderstepoort J. Vet. Res.*, 82: 1-6.
- Brentano, L., B.G. Silva, S. Sayd and S.W. Flores, 2000. Anticorpos para o vírus da anemia das galinhas em matrizes de corte no Brasil. *Rev. Bras. Cienc. Avic.*, 2: 157-179.

- Da Silva, P.S., T.S. Sales, da I.R. Luz, P.C.C. Maia and L.M.B. Fernandes and C.O. Mendes, 2012. Antibodies anti-Infectious Bursal Disease virus and viral genome detection in broilers and chickens backyard at Bahia's poultry production area. *Cienc. Rur.*, 42: 1044-1050.
- Flensburg, M.F., A.K. Ersboll and P.H. Jorgensen, 2002. Risk factors associated with the introduction of acute clinical infectious bursal disease among Danish broiler chickens in 1998. *Avian Pathol.*, 31: 23-29.
- Fussell, L.W., 1998. Poultry industry strategies for control of immunosuppressive diseases. *Poult. Sci.*, 77: 1193-1196.
- Giambone, J.J., T. Dormitorio, T. Brown and K. Takeshita, 1999. Monitoring the immune status of broiler breeders against infectious bursal disease virus using progenie challenge and serologic data. *J. Appl. Poult. Res.*, 8: 362-367.
- Hirai, K., E. Kawamoto and S. Shimkrura, 1974. Some properties of precipitating antigens associated with IBDV. *Infect. Immun.*, 10: 1235-1240.
- MINAG, 2012. *Relatorio Anual de Pecuaria 2012*. Ministerio de Agricultura, Maputo.
- Sharma, J.M., I.J. Kim, S. Rautenschlein and H.Y. Yeh, 2000. Infectious bursal disease virus of chickens: pathogenesis and immunosuppression. *Dev. Comp. Immunol.*, 24: 223-235.
- Sil, G.C., P.M. Das, M.R. Islam and M.M. Rahman, 2002. Management and disease problems of cockrels in some farms of Mymensingh, Bangladesh. *Int. J. Poult. Sci.*, 1: 102-105.
- Tariq, J., 1999. Vaccine and Vaccination. *Agro. Vet. News.*, 25: 22-23.
- Thrusfield, M.V., 1995. *Veterinary Epidemiology*. Black Wall Science, Great Britain.
- Van Den Berg, T.P., 2000. Acute infectious bursal disease in poultry: a review. *Avian Pathol.*, 29: 175-194.
- Vui, T.Q., J.E. Lohr, M.N. Kyule, K.Z. Zessin and M.P.O. Baumann, 2002. Antibody levels against Newcastle disease virus, Infectious Bursal disease virus and influenza virus in rural chicks in Vietnam. *Int. J. Poult. Sci.*, 1: 127-132.
- Young, M., R. Alders, S. Grimes, P. Spradbrow, P. Dias and Q. Lobo, 2002. Controlling Newcastle disease in Village chickens, A laboratory Manual. Australian Centre for International Agriculture and Research (ACIAR). Monograph, 87: 9-142.