ISSN 1682-8356
ansinet.org/ijps

INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

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

International Journal of Poultry Science 8 (10): 963-965, 2009
ISSN 1682-8356

Response to Experimental Vaccination Against Newcastle Disease in Domestic Ducks (*Anas platyrhynchos*): Clinical and Immunological Parameters

Antonio Carlos Paulillo[1,2], Vanessa Sobue Franzo[3],
Elizabeth Moreira dos Santos Schmidt[4,5] and Luciano Doretto Junior[6]
[1]Departamento de Patologia Veterinária, FCAV-Unesp, Jaboticabal, Brazil
[2]Research Fellow CNPq, Brazil
[3]Universidade Federal do Tocantins, Araguaína, TO, Brazil
[4]Post-doctorate Researcher in Veterinary Medicine of FCAV-Unesp, Jaboticabal, Brazil
[5]Bolsista FAPESP, Brazil
[6]Centro de Pesquisas em Animais do Brasil-CPABR, Amparo, SP, Brazil

Abstract: Clinical and immunological aspects of vaccinated domestic ducks against Newcastle disease were evaluated. Forty-eight domestic ducks were distributed into four different experimental groups, vaccinated or not against Newcastle disease: G1 (Ulster 2C strain), G2 (B1 strain), G3 (LaSota strain) and G4 (not vaccinated-control). The immune response was evaluated by the HI test. Domestic ducks showed a moderated to elevated antibody response when vaccinated against Newcastle disease with Ulster 2C, B1 and LaSota strains and no clinical signs associated with post-vaccinal reactions were observed.

Key words: Ulster 2C, B1, LaSota strains, ducks, vaccination, Newcastle disease, *Anas platyrhynchos*

INTRODUCTION

Farm ducks or domestic ducks (*Anas platyrhynchos*, Linnaeus, 1758, Anseriformes: *Anatidae*) have been farmed for thousand of years, possibly starting in Southeast Asia. Almost all of the varieties of domesticated ducks are descended from the wild Mallard duck (*Anas platyrhynchos*). They are kept for meat, eggs and as ornamental birds and decoys. Its production is extensively distributed in several countries around the world and this species can easily adapt to commercial management conditions, with good performance in terms of meat and egg production (Fabichack, 2000; Cullincton, 1975).

Newcastle Disease (ND) is caused by *Avian Parainfluenzavirus* serotype 1 (APMV-1) viruses, which is a member of the genus *Avulavirus*, of the *Paramyxoviridae* family (ICTV, 2007), has been demonstrated, by natural or experimental infection with ND virus, in at least 241 species from 27 of the 50 orders of birds (Kaleta and Baldauf, 1988). Geese and ducks are usually considered resistant even to strains of Newcastle disease virus most virulent for chickens, although outbreaks of disease in ducks associated with ND virus infection have been described (Higgins, 1971). Historically, ND has been a devastating disease of poultry and the global economic impact is enormous (Alexander and Senne, 2008). However, there is little information available on health programs in domestic ducks. Thus, the present study aimed to evaluate vaccination programs against Newcastle disease in this species.

MATERIALS AND METHODS

Experimental birds and management: Forty-eight ducks from 1-52 days of life were distributed in a completely randomized experimental design with four different treatments, with three replicates of four birds each. Birds were designated to treatments, according to vaccination strain as G1 (Ulster 2C), G2 (B1), G3 (LaSota) and G4 (not vaccinated-control).

Ducks were allocated in experimental floor-pen housed, receiving water and feed *ad libitum*. The feed was formulated with corn and soybean according to NRC (1994) and Rostagno (1983) recommendations.

Vaccines: Commercial live NDV vaccines (Ulster 2C, B1 and LaSota strains) were administered to each experimental group, as described by Paulillo *et al.* (1996). Birds were vaccinated at 10 days of age and revaccinated at 30 days of age with the same vaccine strain that was applied in the first vaccination. Vaccine titers were obtained by determining 50% of the embryo-infecting dose in embryonated eggs of specific-pathogen-free breeders at 8 and 10 days of incubation. Titers of live vaccine strains Ulster 2C, B1 and LaSota were 7.15 log10/0.1 mL, 7.2 log10/0.1 mL and 7.35 log10/0.1 mL, respectively. Birds were vaccinated and revaccinated by eye drop.

Serology: Blood samples of Ducks were collected from the jugular vein, from 1-52 days of age, at regular seven days intervals. Sera were inactivated at 56°C for 30 min, frozen and stored at -20°C. Sera samples were submitted to inhibition of Hemagglutination (HI) test, according to Cunningham (1971).

Table 1: Mean antibody titers measured by HI test (log_2) of domestic ducks (*Anas platyrinchus*) submitted to different vaccination programs against ND

		Mean antibody titers measured by HI test (log_2)						
		Ducks´s age (days)						
Group	Vaccine	10	16	23	29	36	42	49
G1	Ulster 2C	0.0	0.8^c	5.8^a	6.3^a	8.3^a	8.5^a	6.8^a
G2	B_1	0.0	3.0^b	5.8^a	3.2^b	7.3^a	5.7^b	6.8^a
G3	LaSota	0.0	4.6^a	6.0^a	6.0^a	8.0^a	8.2^a	7.5^a
G4*	-	0.0	0.0^c	0.0^b	0.0^c	0.0^b	0.0^b	0.0^b

*Control group-not vaccinated against ND. 1-Means followed by the same letter, in the same column, are not different at 5% of probability by Tukey test ($p>0.05$)

The data were analyzed by ANOVA and those with statistical differences were submitted to Tukey´s test at 0.05% using Statview® (version 5.0).

RESULTS AND DISCUSSION

Ducks from all groups vaccinated or not against ND did not show any clinical signs of post-vaccinal reactions.

Mean antibody titers against NDV from ducks are shown in Table 1. At ten days of age, none of the birds showed maternally-derived antibodies against NDV, as breeders were not submitted to any vaccination programs against this disease. As the control group (G4) was not vaccinated, its antibody titers were null during all the experimental period.

At 16 days of age, antibody titers against NDV were detected in the vaccinated groups. This active immunity was induced by vaccination at 10 days of age. Ducks were revaccinated at 30 days of age and this procedure maintained antibody titers against NDV up to 49 days of age. The high antibody titers detected for the ducks vaccinated with the LaSota strain (G3) are compatible with the great diffusion potential of this strain (Winterfield *et al*., 1957). However, the moderate to high antibody titers detected for the ducks vaccinated with Ulster 2C and B1 (G1 and G2) are not compatible with the low invasion capacity of the B1 strain (Hofstad, 1951) and the low diffusion potential of the Ulster 2C strain (McFerran and Nelson, 1971). These results are similar to those reported by Paulillo *et al*. (2008) in partridges. However, these results are different to those reported by Nishizawa *et al*. (2007) in White Pekin Ducks. These authors found low to moderated antibody titers for Ulster 2C, B1 and LaSota strains. Generally, the Tukey test did not demonstrate significant differences among groups vaccinated with B1, Ulster 2C and LaSota strains. The analysis of these serological results clearly shows that ducks produce antibody when vaccinated against Newcastle disease.

Conclusion: Ducks showed a moderated to elevated antibody response when vaccinated with commercially available vaccines for chickens against Newcastle disease, without any clinical signs of post-vaccinal reaction.

ACKNOWLEDGEMENT

Dr. Elizabeth M.S. Schmidt wishes to thank FAPESP (Brazil) for the assistantship (process number 07/59446-7).

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