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Immunological and Clinical Parameters of Newcastle Disease Vaccination in Bronze Turkeys (*Meleagris gallopavo*)

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Abstract: Clinical and immunological aspects of female Bronze Turkeys, on breeding season, vaccinated against Newcastle disease were evaluated. Seventy-five female Turkeys were distributed into five different experimental groups, vaccinated or not against Newcastle disease: G1 (Ulster 2C strain), G2 (B1 strain), G3 (LaSota strain), G4 (LaSota strain inactivated and emulsified in mineral oil) and G5 (not vaccinated-control). The immune response was evaluated by the HI test. Female Turkeys showed high antibody titres when vaccinated against Newcastle disease with live LaSota and inactivated LaSota strains and a moderated to elevated antibody response when vaccinated with Ulster 2C and B1 strains. No clinical signs associated with post-vaccinal reactions were observed.

Key words: Bronze Turkeys, vaccination, Newcastle disease, *Meleagris gallopavo*, Ulster 2C, B1 and LaSota strains

INTRODUCTION

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). ND is one of the main sanitary barriers for the international trade of poultry and poultry products (OIE, 1996). The disease is world-wide distributed in a large range of hosts. Natural or experimental infection with ND virus has been demonstrated in at least 241 species from 27 of the 50 orders of birds (Kaleta and Baldauf, 1988). One of the affected species is the turkey (*Meleagris gallopavo* Linnaeus, 1758, *Galliformes*, *Phasianidae*), which commercial production is extensively distributed in several countries, especially United States, France, Italy, Chile, Brazil, Germany, United Kingdom, Portugal and Mexico for meat and trade (Windhorst, 2006). Although Turkeys are more resistant to virulent ND virus than are chickens (Gray *et al*., 1954), information on immune response to ND vaccines, both live and inactivated, are considerable in chickens, but much less in Turkeys. Thus, this study aimed to evaluate vaccination programs against ND in female Bronze Turkeys during breeding season.

MATERIALS AND METHODS

Experimental birds and management: Seventy-five female Turkeys from one to 364 days of life were distributed in a completely randomized experimental design with five different treatments, with three replicates of five birds each. During the pre-experimental period (0-18 weeks of age), female Bronze Turkeys were vaccinated against Newcastle disease, except those in the control group, with LaSota strain at 10, 35, 90 and 140 days of age by eye drop.

Female Turkeys were allocated in experimental floor-pen housed, receiving water and food *ad libitum*. The feed was formulated with corn and soybean according to NRC (1994) recommendations. The hens were egg-laying from 32-52 weeks of age.

Vaccines: Birds were designated to treatments, according to vaccination strain as G1 (Ulster 2C), G2 (B1), G3 (LaSota), G4 (LaSota inactivated) and G5 (control-not vaccinated). Commercial line NDV vaccines (Ulster 2C, B1 and LaSota strains) were administered to each experimental group, as described by Paulillo *et al*. (1996). All birds, except those in the control group, were vaccinated at 32 weeks of age and revaccinated at 40 and 48 weeks 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,

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Table 1: Mean antibody titres measured by HI test (log_2) of female Bronze Turkeys (*Meleagris gallopavo*) submitted to different vaccination programs against Newcastle disease

		Mean antibody titres measured by HI test (log_2)										
		Female Turkey´s age (weeks)										
Groups	Vaccine	32	34	36	38	40	42	44	46	48	50	52
I*	Ulster 2C	0.0	6.7a	7.4a	6.8a	7.5a	10.4a	6.8a	6.3a	5.7a	6.9a	5.9a
II*	B1	0.0	7.7b	7.0a	7.4a	7.0a	8.6bc	6.0a	6.8a	6.9a	7.2a	7.1bc
III*	LaSota	0.0	7.2ab	7.2a	8.0a	8.3a	7.5b	6.6a	6.4a	6.8a	7.9a	6.1ac
IV*	LaSota (oil)	0.0	0.0c	10.7b	10.5b	10.4b	9.2ac	9.7b	8.1b	9.1b	10.2b	8.9d
V**	Control	0.0	0.0c	0.0c	0.0c	0.0c	0.0d	0.0c	0.0c	0.0c	0.0c	0.0e

**Groups were also vaccinated with LaSota strain at 10, 35, 90 and 140 days of age.

**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)

respectively. Titer of the inactivated vaccine with LaSota strain was 9.5 log10/0.1 ml and this vaccine was emulsified in mineral oil. Birds were vaccinated and revaccinated by eye drop (Ulster 2C, B1 and LaSota-G1 to G3) and vaccinated subcutaneously (LaSota inactivated-G4).

Serology: Blood samples of Turkeys were collected from the ulnar superficial vein, from 32-52 weeks of age, at regular 14 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).

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

Mean antibody titres against ND from female Bronze Turkeys are shown in Table 1. Until 32 weeks of age, none of the birds showed antibodies against ND. As the control group (G5) was not vaccinated, its antibody titres were null during all the experimental period. Hens from all groups vaccinated or not against ND did not show any clinical signs of post-vaccinal reactions.

At 34 weeks of age, antibody titres against NDV were detected in the live vaccinated groups (G1, G2 and G3). At 36 weeks of age, antibody titres against NDV were detected in the inactivated vaccinated group (G4). This active immunity was induced by vaccination at 32 weeks of age. In the revaccinated groups (G1, G2 and G3), Turkeys showed antibody titres against NDV up to 52 weeks of age. LaSota inactivated strain stimulated high antibody titres ($log_2$10.7 and $log_2$10.5). These high antibody titres detected for the female Turkeys vaccinated with LaSota strain (inactivated) (G4) are compatible with the great diffusion potential of this strain (Winterfield *et al*., 1957). The oil adjuvant make a stable emulsion in which the antigen is slowly released, thus a prolonged immune stimulus is observed (Warden *et al*., 1975). These results are similar to those reported by Paulillo (1988) in chicken hens, partridges (Paulillo *et al*., 2008a) and Japanese quails (Paulillo *et al*., 2009) vaccinated with inactivated LaSota strain. On the other hand, Guinea fowls vaccinated with inactivated LaSota strain showed low to moderated antibody titres (Paulillo *et al*., 2008b).

The high antibody titres ($log_2$7.0 and $log_2$8.6) detected for the hens vaccinated with live LaSota strain (G3) are compatible with the great diffusion potential of this strain (Winterfield *et al*., 1957). However, the moderate to high antibody titres detected for the female Turkeys vaccinated with Ulster 2C and B1 (G1 and G2) ($log_2$5.7 to $log_2$10.4), are not compatible with the low diffusion potential of the Ulster 2C strain (McFerran and Nelson, 1971) and with the low invasion capacity of the B1 strain (Hofstad, 1951).

The analysis of these serological results clearly shows that female Bronze Turkeys produce antibody when vaccinated against ND.

Conclusion: Our study has shown that commercially available ND LaSota strain inactivated and live LaSota strain vaccines for chickens induced a high antibody response in female Bronze Turkeys. The present study also showed that hens produced a moderated to elevated antibody response when vaccinated with commercially available live vaccines (Ulster 2C and B1) for chickens against Newcastle disease, without any clinical signs of post-vaccinal reactions.

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