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Study of Experimental Vaccination in White Pekin Duck (*Anas platyrhynchos*) Against Newcastle Disease: Investigation of the State of Virus Carrier

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Abstract: This study aimed the characterization of the importance of vaccination against Newcastle disease in white Pekin duck (*Anas platyrhynchos*), and investigated the state of carrier of the virus in this species. There were used 120 Pekin ducks, distributed at random into 4 groups, vaccinated or not. At 60 days of age, all groups were challenged with a pathogenic virus (NDV) suspension, EID_{50} = $10^{8,15}$/0,1mL. Cloacal and tracheal swabs were collected after 6, 14, 20 and 30 days post-challenge for viral isolation in SPF embryonated eggs. White Pekin duck of all the groups did not demonstrate symptoms of the Newcastle disease. They were refractory to the clinical disease with the NDV. In Pekin ducks from control group, the viral isolation was obtained from 20 up to 30 days after challenge. It was demonstrated therefore the state of carrier of NDV of the Pekin duck. In ducks from vaccinated groups, the viral isolation was null. It was also demonstrated therefore the importance of the vaccination in the suppression of the state of carrier of the NDV in white Pekin ducks.

Key words: Pekin duck, *Anas platyrhynchos*, vaccination, Newcastle disease, state of carrier of the virus

Introduction

Newcastle disease (ND) remains as the most important poultry virosis with highly infectious ability, affecting domestic and wild birds. Routine vaccination combined with sacrifice of affected birds have helped to control the very virulent disease caused by the ND virus (NDV), classified as *Avian Parainfluenzavirus* type 1. Newcastle disease has been the main sanitary barrier for the free commerce of birds and its products between countries (Office International des Epizootes, 1996). At the moment, the disease has a world-wide distribution with a large rank of hosts, in which 27 of the 50 orders of birds have been reported like infected by their etiologic agent (Kaleta and Beldauf, 1996). In this context, there is the specie white Pekin duck, whose commercial raising aims to the meat with high nutritious value, comes developing in Brazil. This increase in production of white Pekin duck may be due to its potential of economic return. These animals are easily adaptable to poultry raising conditions, with elevated production potential; however, until the present moment, studies about the sanitary control have not been made. In this way, the intensive raising of these birds, their movement and the increase of the concentration of the Pekin ducks may facilitate the dissemination of the NDV. Therefore, this investigation had the objective to study the importance of the vaccination in this species against Newcastle disease, and also investigate the state of NDV carrier of the Pekin duck.

Materials and Methods

Experimental birds and management: A total number of 120 day-old white Pekin ducks were distributed into four treatments of 30 birds each, as shown in Table 1. The group was divided into three repetitions with 10 Pekin ducks each, housed in boxes over litter, keeping distance between the other groups. White Pekin ducks nutrition was based on an equilibrated diet for each different growth phase.

Vaccines: Recently manufactured live NDV vaccines were applied to each experimental group according to Paulillo (1980, 1987 and 1989), Paulillo *et al.* (1982), Paulillo *et al.* (1987) and Paulillo (1996). Vaccines titer 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. The titers of the live vaccines with strains Ulster 2C, B1 and LaSota were 7.15 EID_{50}/0,1mL, 7.2 EID_{50}/0,1mL and 7.35 EID_{50}/0,1mL, respectively.

Challenge: At 60 days of age, 12 white Pekin ducks from each treatment (four per repetition) were challenged with viscerotropic ND virus strain. The virus had intra-cerebral

Table 1: Distribution of the white Pekin duck in experimental groups

Group	Vaccination (7 days)	Administration route	Revaccination intra-conjunctiva route (29 days)
G1	Ulster 2C	Intra-conjunctiva	Ulster 2C
G2	B1	Intra-conjunctiva	B1
G3	LaSota	Intra-conjunctiva	LaSota
G4	Control	-	-

Table 2: Results of challenge with viscerotropic velogénica Newcastle disease virus in white Pekin ducks at 60 days of age

Group	Vaccination 7 days)	(Administration route	Revaccination intra-conjunctiva (29 days)	Number of birds	%Total protection
G1	Ulster 2C	Intra-conjunctiva	Ulster 2C	12	100.0
G2	B1	Intra-conjunctiva	B1	12	100.0
G3	LaSota	Intra-conjunctiva	LaSota	12	100.0
G4	Control	-	-	12	100.0
G5	SPF chicks	-	-	12	0.0

Table 3: Results of virus (NDV) isolation in white Pekin ducks after challenge (60 days of age)

Group	Vaccination (7 days)	Revaccination intra-conjunctiva route (29 days)	Viral isolation							
			6DAC		14 DAC		20 DAC		30 DAC	
			T	C	T	T	C	T	T	C
G1	Ulster 2C	Ulster 2C	-	-	-	-	-	-	-	-
G2	B1	B1	-	-	-	-	-	-	-	-
G3	LaSota	LaSota	-	-	-	-	-	-	-	-
G4	Control	-	-	-	-	-	+	+	+	+

T = Trachea, C = Vent, DAC = Days after challenge, + = positive isolation, - = negative isolation

pathogenic index of 1,78 and embryonic death time of 48 hours, with a 50% embryo infecting dose titer of 8,15 EID_{50}/0,1 mL. Distilled water was used as diluent for the inoculum that was instilled by oculo-nasal rout, according to the Code of Federal Regulations (1993). In order to measure the pathogenicity of the NDV challenge strain, a group of Specific-Pathogen-Free (SPF) chicks were used. The birds were housed in isolators with filtered air and offered food and water *ad libitum*.

Virus isolation: At six, 14, 20 and 30 days post-challenge, tracheal and cloacal swabs were collected from all birds of each group to carry out virus isolation, according to methodology of Reed and Muench (1938).

Results and Discussion

Data about the challenge with viscerotropic velogenic NDV in white Pekin ducks are shown in Table 2. None of the Pekin duck groups, vaccinated or not, presented any sign of ND after challenge, which is consistent with the observations of Higgins (1971). On the other hand, 100% of the SPF broilers died due to the NDV challenge. Three days after challenge, the SPF chicks began to present clinical signs such as ruffled feathers, anorexia, depression, conjunctivitis, dyspnea, respiratory disorders, severe and green diarrhea and death. At necropsy, they were observed necrotic lesions in the trachea accompanied by catarrhal exsudate in the lumen, petechial hemorrhages in the proventriculus and hemorrhages in the small intestine and cecal tonsils. NDV was isolated from these SPF chicks, indicating the ability of the NDV used in this trial to cause disease. Another aspect is the results of the challenges of the vaccinated Pekin duck ones or not against the ND (Table 2). Peculiarly, Pekin duck of the control group did not demonstrate symptoms of the Newcastle disease, being refractory to the clinical disease with the NDV. In the groups of vaccinated and non-vaccinated Pekin ducks (Groups 1 to 4), the percentage of protection to the challenge was 100% (Table 2). It is important to stand out, once again, that 100% of SPF chicks inoculated with NDV showed clinical signs and died after challenge, which demonstrated that the virus used in the challenge was working out and reinforces the validity of the obtained results.

The results of the isolation of the NDV velogenic strain in Pekin duck after challenge are in Table 3. In Pekin ducks of control group (Group 4) the viral isolation of the NDV was positive from 20 up to 30 days after the challenge, confirming the susceptibility of this species to the NDV, according to Reis and Nobrega (1956). Through these results it was demonstrated that the state of carrier of the Pekin duck of NDV, passed up to 30 days of the experimental infection with NDV, which can be very important from the epidemiological control of ND.

So, this study concludes that white Pekin ducks showed to be resistant to the development of clinical signs of ND when challenged with velogenic NDV. They are

important in the epidemiology of NDV, because they can eliminate the virus from 20 to 30 days after challenge and the vaccination against ND is important to prevent the elimination of the virus in the field.

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