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Japanese Quail (*Coturnix coturnix japonica*) as Newcastle Disease Virus Carrier

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Abstract: This study was carried out to clarify the real role that was played by the quail (*Coturnix coturnix japonica*) in the epidemiological plan, under the perspective as infection source of the Newcastle disease virus (NDV). For this, they used specific-pathogen-free birds (SPF) that were housed with inoculated quails with a pathogenic strain (velogenic viscerotropic), of NDV ($DIE_{50}=10^{8,15}$/0.1 ml), by the ocular-nasal via. Each group was composed by 6 SPF birds and 12 Japanese quails. After 4, 14 and 20 days since the inoculation of the quails with NDV, 6 SPF birds were put together with each group of quails, so that there was a direct contact among the species. After 5, 14 and 20 days since the challenge of the quails with NDV, the samples were collected through the vent swabs of the quails for the viral isolation (pathogenic virus) in SPF embryos. There was no clinical disease in the quails inoculated with NDV. Therefore, there was viral isolation from 5 to 14 days after the challenge with the NDV, demonstrating, this way the state of carrier of the quail NDV, which happened until 14 days of the experimental infection with this pathogen. So, 100% of the SPF birds which housed with the NDV infected quail, after 5 (group 1) and 14 days (group 2), died from 4 to 7 days after the direct contact among species. This way, the transmission of the pathogenic virus of the quail was evident until 14 days of the experimental infection with this pathogen (NDV) for the SPF birds that housed together, and that calls the attention to the importance of the quail from the epidemiological point of view as potential source of infection of the NDV to commercial birds that housed with these specie or near this breeding.

Key words: Japanese quail, Newcastle disease, epidemiology, NDV carrier

Introduction

The Newcastle disease (NDV) is an important viral infection in birds that could cause several losses for the poultry Industry (Paulillo *et al*., 1982; Paulillo and Doretto Junior, 2000). Due to it the NDV has been in the "list A" of infections disease on "Office International des Epizooties-OIE" (1992). This important disease has been extensively studied in commercial poultry as breeders, broilers, hens and turkeys but only few researches have been carried out to evaluate the function of wild and ornamental birds on NDV epidemiology. In this context is the *Coturnix coturnix japonica*, so-called Japanese quail, which commercial production has been improved every year even in some important Industrial poultry producer's countries. Despite that, the importance of that specie in the epidemiology of NDV is very poor. However, a study of LIMA (2001) showed that Japanese quail could be carrier of NDV by around 14 days after the experimental infection, did not are studies about the importance of this specie to spread the virus to other species of birds, as chickens.

In this context, this study was carried out to clarify the real role that was played by the quail (*Coturnix coturnix japonica*) in the epidemiological plan, under the perspective as infection source of the Newcastle disease virus (NDV).

Materials and Methods

A total number of 36, 17-week-old female Japanese quails (*Coturnix coturnix japonica*) were distributed into three groups of 12 birds each. All quail has negative haemagglutinating inhibition (HI) antibodies titers for NDV.

At 17 weeks of age, 12 birds per group of quail were challenged with a viscerotropic strain of NDV. This virus has intra-cerebral pathogenic index of 1.78 and embryonic death time of 48 hours, with a 50% embryo infecting dose titer of 8.15 log 10/0.1 ml. Distilled water was used as diluent for the inoculum that was instilled by oculo-nasal route, according to the Code of Federal Regulations (1993). At five (group 1), 14 (grup 2) and 20 (group 3) days after challenge with a viscerotropic strain of NDV, six Specific-Pathogen-Free (SPF) 30-day-old broilers were allocated together with the Japanese quail for a direct contact among the species. Every day was observed the presence of NDV clinical signs and mortality in birds.

The birds were housed in isolators with filtered air, and offered feed and water *ad libitum*.

At five, 14 and 20 days after the challenge on Japanese quail and five days after the housed on SPF-broilers, a tracheal and vent swabs were collected from all birds of each group to carried out virus isolation, according to methodology of Reed and Muench (1938).

Blood samples were taken from SPF-boilers during the experimental period, serum was separated by centrifugation at 1000 x g for 15 min, inactivated at 56°C for 30 min, and stored at -20°C until tested.

Haemagglutinating inhibition (HI) antibodies to

Table 1: Results of viral isolation on Japanese quail *(Coturnix coturnix japonica)*, before and after challenge

Birds	Viral Isolation of Vent			
	BC*	5days AC**	14days AC	20 days AC
Codornices *(Coturnix coturnix japonica)*	-	+	+	-

* Before Challenge, ** After Challenge, + = Positive sample, - = Negative sample

Table 2: Results of clinical observation, macroscopic lesions, viral isolation of NDV and serology (HI) of SPF-broilers allocated with Japanese quail *(Coturnix coturnix japonica)* after five (Group 1), 14 (Group 2) and 20 (Group 3) of challenge

Parameters	SPF-broilers allocated with infected quail		
	5 days AC*	14 days AC	20 after AC
Clinical signs suggestive of NDV	+	+	-
Mortality (%)	100	100	0
Lesions suggestive of NDV	+	+	-
NDV isolation (Trachea and Vent)	+	+	-
Serology (HI)	+	+	-

* After Challenge, NDV = Newcastle Disease , HI = Haemagglutinating inhibition test (Geometric Medium titer = $\log_2$ 3.58), + = positive or presence, - = negative or ausence

Newcastle disease using the β method, standardized by Cunningham (1971), were utilized. This involved haemagglutination with live antigen. Antibody titres were obtained by transforming the values of the last dilutions that produced total inhibition of haemagglutination and were expressed as the logarithm to the base 2.

Results and Discussion

All Japanese quail infected with NDV did not show clinical signs or lesions indicatives of NDV, and the results of virus isolation before and after the challenge are in Table 1. The NDV was isolated from Japanese quail from five to 14 days after challenge, which is according with observed by LIMA (2001).

The SPF-broilers allocated with the infected quail died three days after the housed (Table 2). Clinical signs and macroscopic lesions were indicative of NDV, following for virus isolation and NDV identification. These SPF-birds also showed HI antibodies titers by 3.58.

The results showed that the Japanese quail might be a carrier of virus suggesting a important role of this specie on epidemiology of NDV on regions of extensive poultry production.

However the Japanese quail did not show clinical NDV, they spread a sufficient amount of virus for induced an infection and clinical NDV on SPF-broilers allocated in the same place. At light of this results it is possible speculate that the Japanese quail (*Coturnix coturnix japonica*), might be an important carrier of NDV for other poultry species in field situation, and it should be considered on biosecurity management of poultry industries.

On the other way, it is important to observe that SPF-broilers allocated with the quail 20 days after challenge did not show any clinical sign or lesion of NDV and has negative HI antibody titers for NDV. This dates suggested that 20 days after the challenge the Japanese quail did not spread virus sufficient to cause infection in susceptible bird.

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