

CHALLENGE FOR THE REVITALIZATION OF TRADITIONAL PRODUCTION: CONTROL OF NEWCASTLE DISEASE IN BELGRADE DISTRICT

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Abstract: The global situation of Newcastle Disease (ND) is characterized by enzootic infection in many developing countries where village chickens are considered to be the main reservoir of the virus (*Awan et al., 1994*). Newcastle disease has been eradicated in most countries, but in developing countries occasional outbreaks occur and are mandatory reported to OIE. Development of new technologies in production of eggs of special, guaranteed quality by using hens housed in free ranges is becoming very popular trend in our country (*Pavlovski et al., 2010*). In order to further develop such practice our country must be free of ND. The latest notification of ND in Serbia and Belgrade, was in the period from 2006 to 2007. Newcastle disease virus (NDV) caused sporadic outbreaks among non-vaccinated domestic fowl (backyard chickens). The comparative serological data prior to the outbreak (in one district) has shown high titers in unvaccinated backyard flocks. This finding suggested that the virus was not dormant. The distribution of the high antibody titers tends to suggest close contact with infected birds and/or other means of virus transmission that contributes to ND spreading. In the Republic of Serbia preventive vaccination is mandatory for all commercially raised chickens, turkeys, game birds raised in farms and carrier pigeon participating in exhibitions. Control of effectiveness of the vaccine is regularly performed, only in commercial chicken flocks. A serological survey of domestic fowl is done periodically. After the outbreak occurred, small chicken flocks (less than 350 chickens in the household), were vaccinated with La Sota strain. Subsequently the blood samples were collected and investigated in order to estimate the level of protection and to identify vaccinated birds. Continual vaccination programs currently offer the only sustainable prospect for control of ND. The authors give information on the NDV antibody status of the poultry population in one Belgrade district estimated by recommended serological tests.

Key words: backyard chickens, Newcastle disease, outbreaks, serological control.

Introduction

Newcastle disease (ND) is a disease of major importance for poultry and other birds. It is caused by specified viruses of the avian paramyxovirus type (APMV-I) of the family *Paramyxoviridae*. The taxonomy and nomenclature of the family *Paramyxoviridae* was modified and it is now divided into two subfamilies. The subfamily *Paramyxovirinae* has three genera: *Respirovirus*, *Morbillivirus* and *Rubulavirus* which include the Newcastle disease virus (NDV.) Paramyxoviruses characteristically consist of a single molecule single-stranded RNA (Saife et al., 2003; Calnek, 1997). There are three categories of Newcastle disease virus (NDV) velogenic (high virulence), mesogenic (moderate virulence) and lentogenic (low virulence) based on chicken embryo mortality at <60hr, 60-90hr and >90hr respectively, after allantoic inoculation (Hanson and Brandly, 1955).

The disease is characterised by respiratory and/or nervous signs, partial or complete cessation of egg production or misshapen eggs, greenish watery diarrhoea and oedema of the tissues around the eyes and the neck. The infection is spread via direct contact with secretions, especially faeces, from infected birds or indirect contact through contaminated feed, water, equipment, vehicles, humans, fomites etc.

The use of prophylactic and emergency vaccination is permitted in Serbia as well in EU. Newcastle disease is a compulsory notifiable disease in Serbia listed also by the World Organisation for Animal Health (OIE, 2004) and due to its potential for very serious and rapid spread, irrespective of national borders with serious socio-economic consequences requirements for international trade of live animals and animal products are laid down in the Terrestrial code.

The global situation of ND is characterized by enzootic infection in many developing countries where village chickens are considered to be the main reservoir of the virus (Awan et al., 1994). Newcastle disease has been eradicated in most countries, but in developing countries occasional outbreaks occur and are mandatory reported to OIE. In order to develop and revitalize traditional free rearing of poultry, in poultry industry it is very important to monitor NDV presence applying regular serology testing of all poultry flocks and other birds that are in contact to humans and chickens. The particular problem in Serbia is backyard chicken flocks since these birds are not always protected against Newcastle disease and may present virus reservoir for long.

In this paper serology monitoring before and after an outbreak of ND in Belgrade district in the year 2006-2007 is described. Belgrade is the capital of the Republic of Serbia. In Belgrade districts there are 12.806 backyard chicken flocks recorded in Central data base of Veterinary Directorate. At that time regular

vaccination against ND was not done on all of those holdings and subsequently some birds were infected with the wild type virus.

Possible reasons for the virus spread in the district of Belgrade are briefly discussed.

Materials and Methods

Backyard chickens (domestic poultry) in Belgrade district. Prior to the sporadic ND outbreak in the Belgrade district, studies on 690 blood samples originating from non-vaccinated birds from fowl grown in villages for own , non-commercial consumption of meat and eggs were carried out.

After notification of few outbreaks of ND in Serbia, Veterinary Directorate enforced strict control measures on the territory of the whole country, including registration of poultry holdings (including backyard ones) in Central database and vaccination of whole poultry population .

In order to verify the quality of performance of such measures, veterinary service organized blood sampling on different locations in the district and detection of the presence of antibodies against NDV.

In the first stage of the study a total of 900 blood samples of vaccinated birds were analyzed.

Detection of NDV antibodies. To control the antibody titer, the haemagglutination inhibition test (HI-test) with La Sota antigen was used according to (*OIE Manual, 2004*).

Results and Discussion

A few months before the ND was registered, control of serum samples originating from non-vaccinated small floks of domestic layer chickens of different ages from an area close to the zone where ND appeared was carried out. These birds presented hazard to breeding farms. Out of the 690 studied blood samples only 4.84% were tested negative for ND virus. Results are given in Table 1.

Table 1. Results of antibody testing in the Belgrade district before ND outbreak

Tested Flocks in Belgrade District	N° of sera	Results of serology testing		N° of Flocks
		<i>NDV</i> <i>antibody</i>	<i>NDV</i> <i>antibody</i>	
		+	-	
<i>Domestic small flocks</i>	690	620	70	29

In each studied household (29), in the Belgrade district only layer chickens were held. Mean HI titers for each household are presented in Table 2.

Table 2. Mean HI titer before ND outbreak in Belgrade and number of birds/household tested

No birds of tested	Mean HI titres (log ²)	No of birds tested	Mean HI titres (log ²)	No of birds tested	Mean HI titres (log ²)	Age of the layers (years)
64	3.4	17	2.5	36	3.7	1-2.5
29	2.8	16	3.1	13	2.6	
33	1.8	14	4.0	17	0.2	
15	2.3	21	4.9	45	5.9	
27	4.0	24	2.5	9	0.3	
24	1.4	14	2.0	7	3.1	
19	4.3	13	2.7	29	5.5	
13	0.2	10	2.8	38	2.8	
30	3.1	25	3.0	50	3.5	
21	5.8	17	4.1			

According to the Project funded by the Ministry of Agriculture and Forestry and Water Management; Veterinary Directorate of the Republic of Serbia ND vaccination of small domestic flocks was introduced in 36 households in Belgrade. The sera were collected from vaccinated birds 2-3 weeks post vaccination and the obtained results are shown in Table 3.

Table 3. Number of samples, number of flocks and HI test results after vaccination

N° of sera	Serology results		N° of households
	NDV antibody	NDV antibody	
	+	Mean HI titers Log ₂	
900	900	4.9-5.1	36

The number of samples per holding was collected according to the number of birds, thereafter the sample size was between 23 and 27. The mean HI antibody titers were in the interval from 4.9 to 5.1.

In our study, we have found NDV antibodies within the unvaccinated backyard chicken flocks in Belgrade districts. This means that, small poultry flocks were in the contact with the wild type ND virus and subsequently the outbreak occurred. In Serbia vaccination of fowl, farm pheasants and pigeons with lentogenic vaccine strains is compulsory.

Until 2007 serology control of backyard chicken flocks was done occasionally in spite of the strict legal provisions, while in large industrial poultry farms NDV immunity is investigated, by regular serological testing.

Newcastle disease outbreak in backyard poultly flocks in the district of Belgrade was reported to OIE (*WAHID, ND Serbia follow up report, 2006*).

Subsequently, the Ministry of Agriculture, Forestry and Water Management introduced in Serbia improved control measures in poultry production also in village chicken flocks. Despite the difficult socio-economic situation in the country, the State Budget has financed vaccinations in backyard flocks with La Sota vaccine on two occasions during 2007.

Many efforts have been made in Serbia to establish NDV immune status and to collect epizootiological data including the number of households keeping animals, number of flocks, flock size and other, in order to design an efficient monitoring system. Since there were no reports of NDV in the country after year 2007 we concluded that improvement in raising backyard chickens is evident.

There are many ways of NDV transmission over aerosol of infected birds or if the people and equipment become vehicle for the virus spread. It is our opinion that the virus spreading over exotic birds, raising pigeons and game birds in Belgrade is possible. In Epidemiological study of ND in backyard poultry and wild bird populations in Switzerland, (*Shelling et al., 1999*) have described the existence of NDV antibodies in water birds *Tachybaptus ruficollis* and *Phalacrocorax carbo* in 100% and 18.9% samples, respectively.

In the same study in wild birds, such as the Eagle Owl (*Bubo bubo*) and the Sparrow hawk (*Accipiter nisus*) the incidence was 100% and 58.8%, respectively. The most common wild birds discovered in the studied backyards were birds of pray (70%) and crows (15%). This means that transmission of NDV in the nature is possible and that there are no strict ecological boundaries when it comes to ND. Birds in migration know no borders and they carry on their feathers everything present in their environment, either on land or in air.

Kaleta and Baldauf (1988) reported that NDV has been isolated from up to 240 different birds species. It is believed that virtually all known 8000 birds species may become infected and shed NDV, while clinical signs in wild birds populations have been rarely reported.

Due to an increasing international movement of humans and animal commodities, including import of foreign and exotic birds and food of poultry origin in our country, quarantine for imported birds needs to be carefully implemented since trade with such birds is common in the Belgrade region as well

in other regions in the country. Parrots and other psittacine birds are especially dangerous because they can carry exotic Newcastle disease virus and show no signs of disease.

In the period 1984-1995 the analysis of genetic characteristics of ND in the region was conducted (*Wehmann et al., 2003*). Total of 29 isolates from the territories registered to have ND in Serbia were tested. Isolates of ND viruses were named after places, but they also have indication of district area where ND appeared most often. Based on diagnostic examinations and reported cases on the territory of Belgrade ND was registered (*Blažin et al., 1988*), as well as in 2002 (notified case), both times on the territory of Kovačevac, as well as in 2006 on the territory of Koraćica-Kosmaj. Testing of several field ND isolates in Serbia based on chicken embryo mortality indicated the presence of velogenic and mesogenic type virulence (*Miljković et al., 1992*). An experience in previous period shows that the selection of place/location for free rearing of chicken in relation to incidence of ND should not be in the region where poultry is reared intensively, Mladenovac and area in its vicinity.

In 2011 the implementation of the Rulebook on program of measures of animal health protection started, Official Journal of RS RS 24 /11, stipulating that poultry, game birds and pigeons, in all housing systems, must be vaccinated against ND using the lentogenic strain vaccine in order to achieve permanent level of immune protection. Serological controls of all categories of reared poultry are mandatory.

Conclusion

The use of prophylactic and emergency vaccination is permitted in Serbia as well in EU. Continual vaccination programs currently offer the only sustainable prospect for control of ND. It is strongly recommended to establish effective surveillance system of the poultry flocks, pigeon and game birds which should be monitored by veterinary service.

In selection of the place/location for development of traditional free poultry rearing, the areas without intensive poultry production should be selected, territories of hilly configuration and lower population of village poultry. Stated serological results obtained in the control of backyard chickens can be used as guide in indirect detection of the presence of field virus.

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Izazov za revitalizaciju tradicionalne proizvodnje: serološka kontrola Newcastle bolesti u Beogradskom okrugu

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Rezime

U mnogobrojnim zemljama u razvoju, globalna situacija Njukasl bolesti (Njb) se karakteriše enzootskom infekcijom, gde je seoska živina svakako glavni rezervoar virusa (*Awan et al., 1994*). Ona je eradicirana u mnogim razvijenim zemljama, ali u zemljama u razvoju česte su sporadične pojave koje se obavezno prijavljuju OIE. Razvijanje novih tehnologija za proizvodnju jaja posebnog garantovanog kvaliteta sa kobicama koje su slobodne u ispustima, postaje veoma popularni trend u našoj zemlji (*Pavlovski et al., 2010*). U cilju razvijanja takve proizvodnje naša zemlja mora da bude slobodna od ND. Poslednja prijava ND U Srbiji i Beogradu, bila je u periodu od 2006 do 2007. Virus (Njb) iznenada se sporadično pojavio kod dvorišne (domaće živine) u Srbiji, a i na jednom distriktnom području u Beogradu. Komparativni serološki podaci pre pojave bolesti (u jednoj zoni distrikta) ukazali su na postojanje visokog titra antiitela kod nevakcinisanih seoskih jata živine. Ovaj nalaz je ukazivao da virus nije bio skriven. Distribucija visokog titra antitela pokazala je da je živina bila u bliskom kontaktu sa virusom a to je i glavni mehanizam širenja virusa Njb. U proteklom periodu preventivna vakcinacija je obavezna kod svih komercijalnih jata pilića u odgoju, domaće živine, ćurića, fazana i golubova koji su u prometu. Kontrola efikasnosti sprovedene vakcinacije je obavezna jedino, kod komercijalno gajene živine. Domaća živina se ciljano ispituje samo periodično. Nakon sporadične pojave Njb, mala jata živine (do 350 pilića po domaćinstvu) bila su vakcinisana sa La Sota vakcinom, a nakon toga su uzorci krvi sakupljeni radi utvrđivanja nivoa zaštite. Kontinuirani vakcinalni program i uspostavljanje barijere imune zaštite su mere koje se primenjuju u kontroli bolesti. Autori saopštavaju vrednost titra antitela Njb kod ispitane populacije živine u distriktu Beograd, na osnovu preporučenog serološkog testa.

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