

## SEROLOGICAL EVIDENCE OF EGG DROP SYNDROME 1976 (EDS' 76) IN LAYING CHICKENS IN SOUTH EASTERN NIGERIA

EZEMA<sup>1</sup>, W.S., ORAJAKA<sup>2</sup>, L.J.E., OKOYE<sup>1</sup>, J.O.A. and NWANTA<sup>3</sup>, J.A.

<sup>1</sup>Department of Veterinary Pathology and Microbiology, <sup>2</sup>Department of Veterinary Medicine, <sup>3</sup>Department of Public Health and Preventive Medicine, University of Nigeria, Nsukka.

Correspondence: E-mail: [wsezema@yahoo.com](mailto:wsezema@yahoo.com), Tel: +2348037856356

### SUMMARY

Eight and seven commercial farms with records of low egg production randomly selected from Nsukka and Owerri respectively were screened for EDS'76 antibodies using haemagglutination inhibition test. Three and two farms from Nsukka and Owerri, respectively had negative antibodies to EDS'76 virus, while five farms from the two locations each had positive cases. However, out of 620 serum samples from the 5 positive farms in Nsukka, Enugu state 257, (41.5%) were seropositive to EDS'76 virus. Similarly, 203 (39.8%) out of 510 sera from the positive farms in Owerri state had seropositive antibodies. the geometrical mean titre (GMT) of the sera from the two locations were the same (78.8%), although the GMT of the individual farms varied significantly ( $p < 0.01$ ). This study has confirmed the existence of EDS'76 antibodies in the South Eastern states of Nigeria where vaccination against the disease in the laying flock is not generally practiced. It has also been shown from the study that low egg production is associated with increased GMT of EDS'76 in the studied area.

**KEYWORDS:** EDS'76, Antibody, Egg production, Haemagglutination inhibition

### INTRODUCTION

Egg drop syndrome 1976 (EDS'76) is a viral disease of laying birds characterized by sudden drop in egg production, failure to reach peak and malformed eggs (VanEck *et al.*, 1976; Kembu and Durojaiye, 1993). The disease is caused by avian adenovirus belonging to the family avian adenoviridae (MacFerran *et al.*, 1977).

The disease was first reported in the Netherlands and Great Britain in 1976 (Calneck, 1978), and subsequently in many other countries of the world. Nawathe *et al.* (1980) first reported EDS'76 in Nigeria from a commercial poultry farm. The experimental infection of EDS'76 in exotic breeds of birds in Nigeria has been reported by Adene *et al.* (1995). The main site of replication of the virus is the pouch shell gland area of the uterus of sexually matured chickens which is responsible for the production of egg shells. Consequently, the major effects of this disease are sudden fall in egg

production, failure to achieve peak production, laying of shell-less or soft shell eggs (Baxendele *et al.*, 1980).

This disease has been recognised as a potential threat to layers and breeders flock (Nawathe *et al.*, 1980). The economic importance of EDS'76 in poultry industry in Nigeria is enormous as it has been reported by MacFerran (1984) that the syndrome accounts for 30 percent egg loss annually and could result to an estimated annual loss of 20000 tones of eggs in Nigeria (Nawathe and Abegunde, 1980). In view of the reported cases of heavy economic losses in apparently healthy poultry with poor egg production, deformed eggs, and laying of shell-less eggs, this study was designed to sero-examine the laying flocks with poor egg production for antibodies to EDS'76 virus so as to provide evidence for the natural occurrence of the infection in south Eastern Nigeria where no previous report on the disease had been made.

## MATERIALS AND METHODS

### Flocks History

Eight and seven poultry farms whose birds were apparently healthy but with low egg production records were randomly selected from Nsukka, Enugu State and Owerri, Imo State respectively. Each farm was visited and the following information was obtained: Management system, egg percentage lay, age and date of onset of lay, flock size, present and past disease outbreaks and the vaccination history. In each state the farms selected were designated farms I, II, III, IV, V, VI, VII, and VIII

### EDS'76 Antigen/Positive and negative Sera

Commercial EDS'76 antigen with 4 haemagglutination unit, positive and negative sera were obtained from National Veterinary Research Institute (NVRI) Vom, Plateau State, Nigeria

### Test sera samples

Representative numbers of serum sample of 150, 80, 120, 120, 150, 100, 90, and 80 were collected from farms I, II, III, IV, V, VI, VII, and VIII, respectively in Enugu State. Similarly, representative numbers of serum sample of 150, 80, 100, 80, 100, 80, 120, and, 150 were collected from farms I, II, III, IV, V, VI and VII, respectively, in Imo state. These sera were stored at -20°C and used when the need arose.

### Haemagglutination Inhibition (HI) Test

Sera collected from the two states were tested for the presence of EDS'76 antibodies, using haemagglutination inhibition technique as described by Adene *et al.* (1995). Positive threshold titres of 2-4 were regarded as trace, 8-32 as + positive, 64 and above as ++ positive. The geometrical mean titre (GMT) was calculated

using the Tube Number (modified log<sub>2</sub>) and table described by Villegas and Purchasel (1989).

All data were subjected to analysis of variance using the completely randomized design (Steel and Torrie, 1980). Significance of difference between treatment means was determined by Duncan's multiple range test (Duncan, 1955).

## RESULTS

Three farms out of the eight screened in Nsukka had negative antibodies to EDS'76 virus while two out of the seven farms screened in Owerri, Imo state also showed negative antibodies to EDS'76 virus.

Table I shows the flock history of the 15 farms that were examined in Nsukka and Owerri. In the ten positive farms, a total of 460 (40.7%) out of 1130 samples showed antibodies to EDS'76 virus. The prevalent rate and geometrical mean titres for birds in each positive farm are presented in Table 2. Nsukka recorded 257 (41.5%) positive cases out of 620, samples while Owerri had 203 (39.8%) positive cases out of 510 samples examined. Forty deformed and soft-shelled eggs were observed from three farms in Nsukka, while twenty five eggs with similar defects were seen in two farms in Owerri. GMT of the individual farms (I, II, IV and V) in Nsukka was 97.0, 78.8, 147.0, 90.5, and 78.8, with corresponding percentage egg production of 39.9, 42.0, 38.5, 40.1, and 46.5, respectively. Similarly, GMT of the individual farms in Owerri (I, II, III, IV, and V) were 64.0, 90.5, 59.7, 73.3, and 97.0, with the percentage egg production of 59.7, 40.2, 64.0, 59.0, and 42.0, respectively.

TABLE 1: Flock history of farms in Nsukka, Nigeria

Parameters	Farms							
	I	II	III	IV	V	VI	VII	VIII
Flock size	2500	550	1700	175	3500	2000	1500	1800
Age (weeks)	38	40	30	37	28	27	32	26
% Egg production	39.9	42.0	38.5	40.1	40.5	45.0	50.0	60.0
Management system	DL	DL	DL	DL	DL	DL	DL	DL
Vaccination history	FV	FV	FV	FV	FV	FV	FV	FV
Disease suffered previous present.	AS	Nil	FP	Nil	ND	Nil	Nil	ND

DL = Deep Litter, ND = Newcastle Disease, FV = Full vaccination against ND, AS = Ascariasis, FP = Fowl Pox

**TABLE II: Flock history of farms in Owerri, Nigeria**

Parameters	Farms						
	I	II	III	IV	V	VI	VII
Flock size	2104	621	900	780	305	400	2500
Age (weeks)	34	36	42	35	24	30	40
% Egg production	507	40.3	64.0	59.0	42.0	33.0	48.0
Management system	DL	DL	DL	DL	DL	DL	DL
Vaccination history	FV	FV	FV	FV	FV	FV	FV
Disease suffered previous present.	Nil	Nil	Nil	AS	FP	ND	AS

DL = Deep Litter, ND = Newcastle Disease, FV = Full vaccination against ND, AS = Ascariasis, FP = Fowl Pox

**TABLE III: Haemagglutination inhibition antibody titres to EDS'76 virus and its distribution in the positive farms in Nsukka, Nigeria**

HI Titres	Farms					Total
	I	II	III	IV	V	
1:2	14	2	1	2	20	39
1: 4	6		3	3	30	42
1: 8	5		3	4	10	22
1: 16	4				15	19
1:32	14	4	6	3	17	44
1:64	16			4	13	33
1:128	12	2	4	10	12	40
1:256	20	2	12	8	10	52
1: 512	13		10	1	15	39
1:1024:					8	8
Total						338
GMT	97 <sup>b</sup>	78.8 <sup>a</sup>	147 <sup>c</sup>	90.5 <sup>b</sup>	78.8 <sup>a</sup>	
No tested	150	80	120	120	150	620
No. - ve	46	70	81	85	0	282
No. + ve	84	8	35	30	100	257
No. HI traces	20	2	4	5	50	81
% +ve cases	56	10	29.2	25	66.7	

GMT Values in the some row bearing different superscripts differ significantly (a = p< 0.05; b = 0.01)

TABLE IV: Haegglutination inhibition antibody titres to EDS'76 virus and its distribution in the positive farms in Owerri, Nigeria

HI Titres	Farms					Total
	I	II	III	IV	V	
1:2	7	1	2	1	1	12
1:4	10	2	-	2		14
1:8	12	5	-	2		19
1:16	20	4	4		6	34
1:32	10	6	6	3	4	29
1:64	8	4			5	17
1:128	20	8	10	2	10	50
1:256	12		2			14
1:512	12	10		3	5	30
1:1024:	4	2	4			10
Total						229
GMT	64.0 <sup>a</sup>	90.5 <sup>b</sup>	59.7 <sup>a</sup>	73.3 <sup>a</sup>	97.0 <sup>b</sup>	
No tested	150	80	100	100	80	510
No. - Ve	35	38	72	87	49	281
No. + ve	98	39	26	10	30	203
No. HI traces	17	3	2	3	1	26
% + ve cases	65.3	48.75	26	10	37.5	

GMT Values in the some row bearing different superscripts differ significantly (a =  $p < 0.05$  b = 0.01)

## DISCUSSION

The result of our serological investigation on Egg drop Syndrome, 76 in laying flocks in two states of Eastern Nigeria showed high prevalence rates of 42.8% and 39.8% in Nsukka and Owerri, respectively. This is in agreement with the earlier work by Durojaiye and Adene (1988) where they reported the existence of EDS'76 antibodies in Nigeria. EDS'76 virus has been found to be widely distributed in this part of Nigeria which is in confirmation with its existence in both Northern and Western Nigeria (Adene *et al.*, 1989).

However, the prevalence of 40.7% observed in this study in south eastern Nigeria invariably collaborates with the finding of Nawathe and Abegunde (1980), and Durojaiye *et al.* (1991) where they reported the prevalence of 35.7%-92.5% in Northern parts of Nigeria. The detection of high HI antibodies titres to EDS'76 virus in chickens where vaccination against the disease is not practiced is highly suggestive of the infection.

The high titres obtained in the individual farms could only be associated with natural infection

which may be due to repeated exposure to EDS'76 virus. The low egg production performance and failure to reach peaks in all the seropositive farms were in consonance with the earlier report by Van Eck *et al.* (1976) where sudden drop in egg production and failure to reach peak were observed.

It is pertinent to note that the diagnosis of EDS'76 has not been a common practice in Nigeria because of oversight on the disease endemicity coupled with the fact that the disease is not clinically striking like many others such as Newcastle disease, avian flu, infectious bursal disease, fowl typhoid etc.

## CONCLUSION

This study indicates a high prevalence of EDS'76 antibodies in laying flocks in Eastern Nigeria. Therefore, vaccination of commercial breeder and layer flocks against EDS'76 virus is advocated in view of the fact that high prevalence of EDS'76 infection has been established in most parts of the country, Nigeria. It is hereby strongly recommend

that a similar study be carried out in local chickens and other types of birds in order to identify the actual prevalence of the infection in Nigeria and possible source of infection to commercial laying flocks.

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