

## SURVEY ON ANTIBODY AGAINST EGG DROP SYNDROME 1976 VIRUS AMONG BIRD SPECIES IN TAIWAN

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**A serological survey on hemagglutination inhibition (HI) antibodies against egg drop syndrome -1976 (EDS-76) virus was made among domestic birds and wild birds in Taiwan between 1978 and 1984. No antibody was detected in the chicken sera collected in 1978 and sera of turkeys and wild birds collected in 1984. However, HI antibodies were demonstrated in sera from chicken collected in 1980 (7.3%) and 1982 (30.3%). Hence it is suspected that the virus was introduced into chicken flocks in Taiwan between 1978 and 1980. In addition, HI antibodies were demonstrated in sera from domestic ducks (31.3%) and geese (11.4%) collected in 1980.**

Outbreaks of the egg drop syndrome-1976 (EDS-76) have been reported in several European and Asian countries.

the authors reported first that EDS-76 had occurred in 1982. In present study, a survey on antibody against EDS-76 was made among domestic birds and wild birds in Taiwan.

### MATERIALS AND METHODS

#### Sera collection

In 1980, a total of 2,644 sera of broiler and 609 sera of breeder chickens were randomly collected from 175 chicken farms of 18 counties in Taiwan. In addition, 786 sera of breeder chickens from 77 breeder flocks of 8 counties were also collected in 1982. Another 200 sera collected in 1978 from 7 counties were selected for a retrospective study.

In 1980, 556 sera of duck from Tainan and I-LAN counties and 201 sera of geese from 3 counties were collected.

In 1984, 53 sera from 9 species of wild birds (8 spotted-necked dove, 9 schoveller, 2 short-eared owl, 2 white-naped crane, 5 eastern

kentish plover, 6 grayrumped talttler, 6 godwall, 3 teal, and 12 egret) caught in southern Taiwan and 30 sera of turkey from a farm in Tainan county were collected.

#### **Removal of Nonspecific Inhibitors in Sera**

All the sera of ducks, geese, turkeys and wild birds were treated as following procedure in order to remove nonspecific inhibition factors in hemagglutinations. One fifth ml sera was treated with 0.4 ml 10% chicken packed erythrocytes in 4°C overnight, then treated with 0.5ml 25% kaolin solution for 30 minutes at room temperature. All the sera were then inactivated by 56°C for 30 minutes.

#### **Antigen**

TN strain of EDS-76 virus,<sup>(7,10)</sup> propagated in duck embryo was used as antigen.

#### **Hemagglutination (HA) and Hemagglutination-Inhibition (HI) Tests**

The HA test and HI test were carried out by the conventional microtitre methods as described previously.<sup>(7,10)</sup> According to Yamaguchi,<sup>(13)</sup> titres of 1:4 and higher in chicken sera were regarded as positive, and titres of 1:10 and higher in other species were regarded as positive according to Firth et. al.<sup>(6)</sup>

### **RESULTS**

The results of HI antibody against EDS-76 virus among birds species in Taiwan are summarized in Table 1-5. In 1978, a total of 200 chicken sera were randomly collected from 20 towns of 7 counties in Taiwan. The age of these chickens were ranged from 3 to 17 weeks. Among these chickens, 90 broiler, 30 breeder, 40 layer, 20 mixer, and another 20 were lack the information of their breeds. All these 200 sera showed negative in EDS-76 antibody as given at Table 1.

Antibody against EDS-76 was detected neither in all 30 turkey's sera nor in all 53 wild bird's sera collected in 1984.

HI antibodies were demonstrated in sera from chicken sera collected during 1980 and 1982. (Table 2-3) In 1980, a total of 3,273

chicken sera were randomly collected from 175 chicken farms of 18 districts in Taiwan. Result of the HI tests revealed that sera from 56 out of 175 farms were shown positive reaction against EDS-76 virus, the average positive rate was 7.3%(236/3,273). In 1982, a total of 786 chicken breeder farms of 8 major chicken production counties in Taiwan. Result of the HI tests indicated that sera from 41 out of 77 farms were positive and the average positive rate was 30.3% (238/786).

Table 1. Egg Drop Syndrome-1976 Antibody Survey in Chicken Flocks of Taiwan in 1978

Counties	Town	Age in Weeks	Type of Chicken	No. Positive/ No. Tested
Taipei	Ta-Cheng	8	Broiler	0/10
Taoyuan	Ta-Yuan	3	Breeder	0/10
	Ta-Chi	8	Breeder	0/10
	Ping-Chen	17	Breeder	0/10
Taichung	Ching-Shui	8	Mixer	0/10
	Shen-Kang	NI*	Mixer	0/10
Chiayi	Chu-Chi	8	Broiler	0/10
	Ming-Siung	4	Broiler	0/10
	Shui-Shang	4	Broiler	0/10
	Pu-Tzu	4	Broiler	0/10
Tainan	Shan-Shang	8	Layer	0/10
	Hsia-Ying	8	Broiler	0/10
	Yen-Shui	4	Broiler	0/10
	Shan-Hua	4	Broiler	0/10
	Lung-Tien	NI	Broiler	0/10
Kaohsiung	NI	NI	NI	0/10
	NI	NI	NI	0/10
Pingtung	Chiu-Ju	6	Layer	0/10
	NI	8	Layer	0/10
	NI	4	Layer	0/10
Total	20			0/200

\*NI: No Information.

**Table 2. Egg Drop Syndrome-1976 Antibody Survey in Chicken Flocks of Taiwan in 1980**

Counties	Broiler Positive			Breeder Positive			Total Positive		
	Farm*	Rate**	(%)	Farm	Rate	(%)	Farm	Rate	(%)
I-Lan	0/8	0/160					0/8	0/160	0
Taipei	1/8	3/135	2.22	1/3	2/65	3.08	2/11	5/200	2.5
Taoyuan	0/10	0/200					0/10	0/200	0
Hsinchu	0/5	0/100					0/5	0/100	0
Miaoli	0/2	0/40					0/2	0/40	0
Nantu	3/8	6/160	3.75				3/8	6/160	3.75
Taichung	5/17	11/346	3.18				5/17	11/346	3.18
Changhua	10/14	27/273	9.89	2/10	2/88	2.27	12/24	29/361	8.03
Yunlin	1/3	3/36	8.33	4/7	35/87	40.22	5/10	38/123	30.9
Chiayi	2/6	3/120	2.5	4/9	34/179	18.99	6/15	37/299	12.37
Tainan	2/7	2/139	1.44	5/10	58/190	30.53	7/17	60/329	18.24
Kaohsiung	1/10	2/200	1.0				1/10	2/200	1.0
Pingtung	2/14	3/280	1.07				2/14	3/280	1.07
Taitung	4/8	5/160	3.13				4/8	5/160	3.13
Hualian	5/6	20/120	16.66				5/6	20/120	10.66
Penghu	2/3	7/54	12.96				2/3	7/54	12.96
Taichung City	0/1	0/21	0				0/1	0/21	0
Tainan City	2/6	15/120	12.5				2/6	15/120	12.5
<b>Total</b>	<b>40/136</b>	<b>107/2,664</b>	<b>4.02</b>	<b>16/39</b>	<b>131/609</b>	<b>21.51</b>	<b>56/175</b>	<b>238/3,273</b>	<b>7.27</b>

\*No. of positive farms/No. of farms tested

\*\*No. of positive sera/No. of sera tested

**Table 3. Egg Drop Syndrome-1976 Antibody Survey in Breeding Chicken Flocks of Taiwan in 1982**

Counties	Positive Flocks*	Positive Rate **	(%)
Kaohsiung	10/10	80/98	81.6
Tainan	6/10	18/100	18.0
Yunlin	4/10	26/100	26.0
Pingtung	4/12	21/120	17.5
Taoyuan	1/10	1/120	0.8
Chiayi	4/10	22/100	22.0
Changhua	9/10	57/100	57.0
Taichung	3/5	13/48	27.1
<b>Total</b>	<b>41/77</b>	<b>238/786</b>	<b>30.3</b>

\*No. of positive farm/No. of farm tested

\*\*No. of positive sera/No. of sera tested

Five hundred and fifty six sera of duck from Tainan and I-Lan were collected in 1980. HI antibodies were demonstrated in 173 (31.1%) out of 556 sera as shown in Table 4. The positive rate of Tainan county and I-Lan county were 30.7% and 31.6%, respectively.

As given at Table 5, HI antibodies were detected in 23 (11.4%) out of 201 geese sera. The positive rates of 3 counties were ranged from 5.7 to 44.4.

Table 4. Egg Drop Syndrome-1976 Antibody Survey in Domestic Ducks of Taiwan in 1980

Counties	Positive Rate*	(%)
Tainan	92/300	30.7
I-Lan	81/256	31.6
Total	173/556	31.1

\*No. of positive sera/No. of sera tested

Table 5. Egg Drop Syndrome-1976 Antibody Survey in Geese of Taiwan in 1980

Counties	Positive Rate*	(%)
Taoyuan	8/18	44.4
Taipei	10/95	10.5
Kaohsiung	5/88	5.7
Total	23/201	11.4

\*No. of positive sera/No. of sera tested

## DISCUSSION

The results of the serological survey on antibodies against EDS-76 in chicken flocks in Taiwan in 1978, 1980 and 1982 indicated that the disease was probably introduced into chicken flocks in Taiwan between 1978 and 1980. It is also suggested that the disease was already widespread all-over Taiwan in 1982.

Moreover, antibodies against EDS-76 were in 31.3% of domestic ducks and 11.4% of geese investigated. The presence of antibodies in ducks has been reported in many countries such as England, USA, Greece, France and Northern Ireland. Furthermore, a similar haemagglutinating adenovirus has been isolated from clinically healthy ducks by Baxendale and Villegas. Bartha have reported a case of dropped egg production in ducks associated with EDS-76. Some duck flocks with dropped egg production were also observed in Taiwan; Does these cause by EDS-76 virus infection is under investigated.

On the other hand, no positive serum was detected in a few serum samples of turkeys and wild birds collected in southern Taiwan in 1984 for the investigation of EDS-76 infections. Wilcox et al. (12) have conducted a serological survey on 392 serum samples from 11 species of seasonal or sedentary wild birds in Western Australia from 1977 to 1979. Antibody against EDS-76 virus was detected in only one species (black duck; *Anas superciliosa*). but Bartha et al. have detected HI antibodies against EDS-76 in sera of 59% wild ducks and 20% of herring gulls investigated. Since the number of serum sample collected was limited, further studies are necessary to clarify the epidemiologic significance of the wild birds in EDS-76 infections.

Further investigation on whether the EDS-76 virus was introduced into Taiwan chicken flocks via imported into stock flocks or via other avian species such as ducks, geese or wild birds is needed more thorough investigation before it can be concluded.

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# 台灣家禽及野禽產蛋下降症—1976 (EDS-76) 之血清學調查

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以血清學方法調查本省家禽及野禽之EDS - 76 血球凝集抑制抗體，結果發現在1978年本省雞群尚未有陽性雞隻存在，但在1980年所調查的18縣市的175戶養雞場中，竟有56場（32%），亦即在3,273隻雞中有238隻（7.3%）為陽性，在1982年則在786隻種雞中有238隻（30.3%）為陽性，因而確認本省已有高陽性率之EDS - 76 抗體，並且EDS - 76 可能係在1978 ~1980年間引入本省雞群。

又在1980年調查本省鴨及鵝的EDS - 76 抗體，結果陽性率分別為31.1%及11.4%。在1984年所收集的少數野鳥及火雞血清中則未發現有EDS - 76 抗體存在。