

## SEROLOGICAL STATUS OF EGG DROP SYNDROME IN BREEDERS AND COMMERCIAL LAYERS IN MANSEHRA DISTRICT

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### ABSTRACT

A serological survey was conducted to see the prevalence of antibodies to egg drop syndrome (EDS) virus in breeders and commercial layers in Mansehra district. A total of 50 flocks including broiler breeder (30), layer breeder (10) and commercial layers (10) were surveyed from September, 2002 to March, 2003. Paired serum samples were collected at random from 20 birds in each flock at fortnight interval and screened through haemagglutination inhibition (HI) test. In broiler breeders, out of 30 flocks, 12(40%) were serologically positive for EDS. In layer breeders and commercial layers, 30 and 20% flocks were found to be seropositive, respectively. On the basis of age, maximum seroprevalence (42.85%) was observed in birds between 21-40 weeks of age. The seroprevalence was 33.33% in 1-20 weeks, 26.66% in 41-60 weeks and 25.00% in 61 weeks and above old birds. No specific clinical signs were observed in all three types of birds. A drop in egg production (22.555%) was observed in seropositive flocks along with misshapen soft shelled, shell-less and non-pigmented eggs. Based on these findings, the farmers were advised to vaccinate their flocks against EDS between 14-16 weeks of age using killed adjuvanted vaccines.

**Key Words:** Egg drop syndrome, seroprevalence, haemagglutination inhibition test.

### INTRODUCTION

Livestock sector plays an important role in the agricultural economy of Pakistan. It accounts for almost 50% of agricultural value added and about 11.4% of the GDP (Economic Survey, 2003-04). In Pakistan, the investment in poultry sector is about 1 billion US dollars. The importance of poultry industry can be judged from the fact that every family in rural and every fifth family in urban areas are directly or indirectly associated with poultry production (Sadiq, 2004). Despite improved management methods and disease preventive measures adopted in the public and private sectors, overall poultry population always remained victim to a number of infectious and non infectious diseases. Among infectious diseases, egg drop syndrome (EDS) is posing a serious threat to poultry industry. The EDS was first reported in chickens during 1976 by Dutch workers (Van-Eck *et al.*, 1976). The causative agent is a haemagglutinating duck adenovirus-1 belonging to genus atadenovirus of family adenoviridae. It is a DNA virus, 74-80 nm in diameter and replicates in the nucleus of the host cells (Regenmortel *et al.*, 2000; Mc-Ferran, 2003).

Duck and geese are the natural hosts of EDS virus, although the disease outbreaks can occur in laying hens and breeders. The infected birds lay soft shelled, shell-less, mis-shapen and discoloured eggs without any change in the internal quality. There are no obvious clinical signs of the disease, however in acute cases, there may be mild depression. Outbreaks usually last upto 9-10 weeks and egg production can be reduced upto 40% (Yamaguchi *et al.*, 1980; Mc-Ferran, 2003).

The EDS virus grows best in embryonated duck eggs and haemagglutinates only avian but not mammalian erythrocytes (Muhammad *et al.*, 1999). The haemagglutination inhibition (HI) is the best test for its diagnosis (Mc-Ferran, 2003).

The prevalence of this disease is upto 50% in most of the countries. However, the information in this regard is scanty in our country. During mid and late nineties, a number of commercial and breeder chicken flocks were reported to have a sharp decline in egg production and a high incidence (39%) of EDS was reported in Rawalpindi and Faisalabad districts (Naeem, 1994; Siddique and Haq, 1997).

The present study was conducted to investigate the seroprevalence of EDS in breeders and commercial layers in thickly breeder populated area of Mansehra district of Pakistan.

### MATERIALS AND METHODS

#### Collection of samples

From September, 2002 to March, 2003, commercial layers and breeder flocks in and around Mansehra district were selected. A total of 50 flocks including broiler breeder (30), layer breeder (10) and commercial layers (10) were surveyed. The paired blood samples were taken directly from wing veins from 20 randomly selected birds in each flock at fortnight interval, serum was separated, heat inactivated at 56°C for 30 minutes in water bath and stored at -20°C till further use.

The clinical signs and egg production were examined during the whole study period. From each flock 20 eggs were also collected for egg shell quality.

### Serological studies

Haemagglutination (HI) test was first performed using EDS antigen (Solvay International, USA) and 4HA unit was calculated (Allen and Gough, 1974). Hyperimmune serum was raised against EDS antigen to be used as positive control (Hussain *et al.*, 2004). All the test serum samples were then subjected to HI test to determine antibody titers against EDS virus using 4HA unit. The constant virus decreasing serum (Beta procedure) was used, as described by Buxton and Fraiser (1977). The HI test was also performed using Newcastle disease and infectious bronchitis antigens. The seroprevalence percentages were calculated in different types of birds, in different age groups and at different localities separately.

## RESULTS AND DISCUSSION

Sudden drop in egg production may occur in many infectious and non infectious diseases. Among infectious conditions, EDS, Newcastle disease (ND) and infectious bronchitis (IB) are the three most important conditions. Since its initial description, EDS has become a major cause of loss of egg production throughout the world (Calnek *et al.*, 1991; Mc-Ferran, 2003). In Pakistan during 1993-94, the problem of sudden drop in egg production along with defective egg shell was seen in 12 breeder flocks around Rawalpindi and was suspected for EDS (Naeem, 1994). During 1994-1996, serological survey was conducted in 80 commercial layer flocks around Faialabad and seroprevalence of EDS was found to be 42.5% (Siddique and Haq, 1997).

In the present study, out of 50 flocks 17(34.87%) were seropositive for EDS (Table 1). The maximum seroprevalence of EDS was found in broiler breeder (40%), followed by layer breeder (30%) and commercial layers (20%). The specific initial HI, geometric mean titre (GMT) and at least two to three fold increases in GMT at fortnightly interval was the criterion of seropositivity in the present study. Moreover, the specific immunity to EDS was also confirmed through HI test by using ND and IB antigens. All the seropositive samples for EDS did not inhibit the haemagglutination potential of Newcastle disease and infectious bronchitis viruses. The minimum GMT at day 1 (first sampling) among 17 seropositive flocks was 57 and maximum was 1176.26 at day 15 (second sampling), as detailed in Table 2. These results are in agreement with those of Siddique and Haq (1997). The seroprevalence varied from 16.66 to 50.00% in different areas of Mansehra district. The maximum seroprevalence (50%) was found in Mangal, followed by Shinkiari (37.50%) and Baidra (36.37%). The minimum seroprevalence (16.66%) was found in Ghazikot (Table 3).

**Table 1: Seroprevalence of egg drop syndrome in various types of birds**

Bird type	Total flocks	Sero-positive flocks	Sero-negative flocks	Sero-prevalence (%)
Broiler breeders	30	12	18	40
Layer breeders	10	3	7	30
Commercial layers	10	2	8	20
Total	50	17	33	34.87

**Table 2: Geometric mean titre (GMT) of antibodies against egg drop syndrome virus**

Sr. No.	Flock No.	Age (weeks)	GMT	
			Day 1	Day 15
1	46	19	57.00	199.00
2	48	20	63.00	196.00
3	11	28	57.00	194.00
4	20	29	337.79	630.34
5	38	29	73.00	188.00
6	25	31	588.13	955.42
7	26	31	315.17	445.72
8	19	34	315.17	445.72
9	24	36	776.04	1176.26
10	31	37	477.71	955.42
11	27	39	63.00	198.00
12	42	32	57.00	285.00
13	43	39	222.86	448.00
14	15	43	59.71	198.00
15	40	45	415.87	675.58
16	8	61	675.58	955.42
17	13	65	274.37	512.00

**Table 3: Seroprevalence of egg drop syndrome in different localities of Mansehra**

Locality	Total flocks	Sero-positive flocks	Sero-negative flocks	Sero-prevalence (%)
Shinkiari	8	3	5	37.50
Mangal	8	4	4	50.00
Baidra	22	8	14	36.37
Ghazikot	12	2	10	16.66
Total	50	17	33	34.87

On the basis of age, the flocks were divided into 4 groups. Maximum (42.85%) seroprevalence was found in those flocks which were between 21-40 weeks of age (Table 4). The EDS outbreaks usually last 4-10 weeks (Mc-Ferran, 2003). The most susceptible period is between 14 to 25 weeks, when the laying usually starts and bird is unable to achieve the normal egg production level. If the disease is due to reactivation of latent virus,

**Table 4: Seroprevalence of egg drop syndrome in relation to the age of the flocks**

Age (weeks)	Total flocks	Positive flocks	Negative flocks	Sero-prevalence (%)
1-20	6	2	4	33.33
21-40	21	9	12	42.85
41-60	15	4	11	26.66
61 & above	8	2	6	25.00
Total	50	17	33	34.87

the fall usually occurs when production is between 50% and peak level (Mc-Ferran, 2003). The flocks in very early age did not show antibodies to EDS in the present study. This is because the ovaries and oviducts are usually inactive at this stage.

Apparently, all the flocks studied were quite healthy and did not reveal any clinical sign. Feed and water consumption were almost normal. However, all the flocks seropositive for EDS showed a drop in egg production, ranging from 10 to 40% with an average of 22.55%. In seronegative flocks, only 6-10% drop in egg production was recorded. Siddique and Haq (1997) also reported 10 to 62% drop in egg production in 80 commercial layer flocks seropositive for EDS around Faisalabad. Egg production can be reduced upto 40% however, there is usually compensation later in lay, so that the total number lost is usually 10-16 eggs per bird (Mc-Ferran, 2003).

The most striking feature in seropositive flocks was laying of soft-shelled, thin-shelled or shell-less eggs. However, internal quality of egg was normal. In brown layers (2 flocks), there was loss of pigmentation. However, the size of egg was almost normal. These findings are in line with those of Siddique and Haq (1997) and Mc-Ferran (2003).

Based on these results, it was concluded that there is high prevalence of EDS in broiler breeders, layer breeders and commercial layers in Mansehra district. As this is a thickly breeder populated area, it can add a lot to the overall economical losses to poultry industry of the country due to loss in egg production every year. Thus, all the farmers are advised to vaccinate their flocks with EDS killed adjuvanted vaccine well before the start of laying i.e. between the age of 14-16 weeks. This will not only save the economical losses but will also help to implement a better disease control programme against EDS in the country.

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