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Prevalence of Fowl Cholera (*Pasteurella multocida*) in Commercial Broiler Breeder Flocks Maintained in Abbottabad and Mansehra

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Abstract: Morbid materials from 25 commercial broiler breeder farms located in Abbottabad and Mansehra districts were collected over one year period to investigate prevalence of Fowl cholera and study efficiency of various organs to be used as diagnostic tools for Fowl cholera. Overall incidence of Fowl cholera was (0.80±0.26%) with a coefficient of variation of 231.45%, indicating significantly higher incidence (1.07±0.62%) in Mansehra than in Abbottabad (0.53±0.34%). Significantly ($p<0.05$) lower incidence of Fowl cholera was found in vaccinated (0.15±0.26%) than in non-vaccinated flocks (1.45±0.63%). Higher incidence (1.35±0.38%) of Fowl cholera was found in farms previously exposed to Fowl cholera disease as compared to those in which there was no previous incidence (0.25±0.29%). Fowl cholera was found positively ($p<0.01$) and significantly associated with flock age ($b=0.074661\pm0.03389$) but negatively associated with egg production ($b=-16.24429\pm0.928103$). Liver was found to be the best organ for diagnosis of Fowl cholera in broiler breeder flocks.

Key words: Broiler breeder, egg production, Fowl cholera, liver and vaccination

Introduction

Fowl cholera is one of the bacterial diseases causing heavy economic losses in poultry productivity. The disease has been reported to causes 1.8–21% mortality and a decline in egg production by 15-20% (Kapetanov *et al.,* 2000). In fact it's a heavy loss and the rapid decline in egg production could result in a smaller egg laying period as the infected flocks are to be culled at an earlier stage. Compi *et al.* (1990) also reported a significant decrease in egg production and shorter egg laying cycles in infected flocks. Proper hygienic measures and effective vaccination against Fowl cholera would be the primary steps in preventing this disease. However, efforts shall be made to ensure its proper control as prevalence of the disease has been reported despite vaccination (Jonas *et al.,* 2001 and Rajini *et al.,* 1995). The findings suggested that there may other associated factors proving as vectors for the onset of this disease. Thus, better hygienic conditions would be helpful in prevention of this disease. As mentioned earlier on that the disease could result in a severe decline in egg production, therefore efforts shall be made to reduce chances of its incidence in order to ensure healthy productivity. Its timely and effective diagnosis will help in preventing heavy losses. The present study was therefore planned to investigate the prevalence of fowl cholera in broiler breeders intensively produced in Abbottabad and Mansehra districts and report a best diagnostic organ amongst the various morbid materials used for the diagnosis of Fowl cholera.

Materials and Methods

The study was conducted in coordination with Veterinary Research and Diagnostic Centre, Dhodial, Mansehra by selecting 25 broiler breeder flocks in Abbottabad and Mansehra to investigate prevalence of Fowl cholera and study efficiency of various organs to be used as diagnostic tool for Fowl cholera. Morbid materials were collected over one year period from 25 broiler breeder flocks. Morbid materials (liver, spleen and bone-marrow) collected from the dead birds during routine visit were transferred into tryticase soya broth used as transport media in sterile 20 ml bottle. Information regarding flock size, strain of the chicken, previous out break of Fowl cholera if any, age of the chicken at the onset of disease, vaccination program and percent egg lay were recorded. Laboratory tests for diagnosis of Fowl cholera were performed. The data were analyzed, using univariate, GLM (General Linear Model) procedure (Steel and Torrie, 1981) and simple and multiple regression models. Association of flock size; age and percent lay with Fowl cholera was worked out by constructing the following model adopting the procedure outlined by Wonnacott and Wonnacott (1985).

$$Y = b_0 + b_iX_i + ei$$

Where "Y" was response variable, "b_i" the partial regression co-efficient, "X_i" the regressors and "ei" the residual term.

To study the effect of farm location, vaccination program, previous out break of cholera in a flock, strain of the chicken and age of the chicken at the onset of

disease on prevalence of Fowl cholera, following model was constructed adopting the procedure of Steal and Torrie (1981).

$Y_{ijklmn} = \mu + a_i + B_j + C_k + D_l + F_m + e_{ijklmn}$

Where;

Y_{ijklmn} = response variable,

a_i = the effect of i-th vaccination program; (i = Vaccination against Fowl cholera and no vaccination).

B_j = the effect of j-th history of the Fowl cholera in the flock; (j = No previous outbreak of Fowl cholera and previous outbreaks),

C_k = the effect of k-th strain of the chicken; (k = Arber acor and Hubbard),

D_l = the effect of l-th age of the chicken at the onset of diseases; (l = 38-42 weeks, 43-47 week, 48-52 weeks and > 52weeks).

F_m = the effect m-th location; (m = Abbotabad and Mansehra)

e_{ijklmn} = the residual term associated with e_{ijklmn}, normally, identically and independently distributed with mean zero and unit variance.

A similar, model was used to investigate the best suitable organ for diagnosis of fowl cholera.

Results and Discussion

Prevalence of Fowl Cholera: Overall prevalence of Fowl cholera in broiler breeder flocks was 0.80 ± 0.26 with a coefficient of variation of 231.45% (Table 1). Muhairwa *et al.* (2001) also reported similar prevalence of Fowl cholera in chicken whereas, Abd-Alla (2000) reported higher incidence (4.1%) in apparently healthy and 9.7% in diseased Turkey. The lower prevalence of Fowl cholera in the present study may be due to better care of the flocks and appropriate hygienic measures adopted for broiler breeder production.

Farm's location significantly ($p<0.01$) affected prevalence of Fowl cholera in broiler breeder flocks. Significantly ($p<0.05$) higher prevalence was observed in Mansehra a hilly area (1.07 ± 0.62) than in Abbotabad comparatively less hilly area (0.53 ± 0.34%; Table 1). The higher prevalence of Fowl cholera in Mansehra could probably be due densely populated breeder farms.

Vaccination had a significant ($p<0.01$) effect on fowl cholera prevalence. Prevalence of Fowl cholera was significantly ($p<0.01$) higher in non-vaccinated (1.45 ± 0.63%) than in vaccinated flocks (0.15 ± 0.26 %; Table 1). Findings of the present study were contrary to Rajini *et al.* (1995) and Jonas *et al.* (2001) who reported outbreaks of Fowl cholera in vaccinated flocks. The outbreak in vaccinated flocks in the aforementioned studies could be due to vaccine failure or immunosupperssion, however, findings of the present study suggested effective use of vaccines in controlling Fowl cholera.

Farms where previous outbreaks of Fowl cholera were observed, significantly ($P< 0.01$) favored the onset in commencing flocks. Significantly ($p<0.05$) higher prevalence was found in flocks maintained at farms previously exposed to Fowl cholera (1.35 ± 0.38 %) than others (0.25 ± 0.29 %; Table 1). This could probably be due to poor disinfection procedures or other hygienic measures taken for disinfecting the farms.

Flock size and strain of the chicken had no effect whereas, age of the birds significantly ($p<0.01$) affected prevalence of Fowl cholera. Significantly ($p<0.05$) higher prevalence was found in more than 52 weeks old birds (1.14 ± 0.38 %) as compared to 43 to 47 weeks old birds (0.74 ± 0.25%; Table 1). Findings of the present study were not in line with the findings of Waltman and Horne (1993) who reported higher

Table 1: Incidence of Fowl cholera in broiler breeders maintained in Abbotabad and Mansehra districts

Variables	Mean ± SE
Farm Location	
Abbotabad (less hilly area)	0.53_b ± 0.34
Mansehra (more mountainous area)	1.07_a ± 0.62
Vaccination Practice	
Flocks vaccinated	0.15_b ± 0.26
Non-vaccinated flocks	1.45_a ± 0.63
Fowl cholera history of the farm	
Fowl cholera previous occurred in the farm	1.35_a ± 0.38
No occurrence before	0.25_b ± 0.29
Age-wise incidence of Fowl cholera	
38-42 weeks	0.44_c ± 0.21
43-47 weeks	0.74_{bc} ± 0.28
48-52 weeks	0.88_b ± 0.28
Above 52 weeks	1.14_a ± 0.28
Breed-wise incidence of Fowl cholera	
Arber acor	0.76 ± 0.26
Hubbard	0.52 ± 0.21
Overall incidence of Fowl cholera	0.80 ± 0.26

Means with different subscripts letter(s) were significantly different for each variable at p = 0.05

Table 2: Prediction of Fowl cholera from flock size and age of the birds

Response variable (X_0) = Fowl cholera			
Regressors:			
X_1 = Flock age			
X_2 = Flock size			
Estimators	b_0	b_1	b_2
Parameter estimate	8.57211.5	0.074661	0.00096
±SE	3.51280	0.03389	0.00023
T	2.44000	1.91700	0.41700
P	0.01860	0.06120	0.67870

Adjusted R^2 = 83%

incidence of Fowl cholera at the age of 33 weeks in chicken. Fowl cholera was found significantly ($p<0.06$) and positively associated ($b=0.074661\pm0.034$) with age of the chicken but non-significantly associated with flock size ($b=0.00096\pm0.00023$; Table 2), suggesting that prevalence was increased with the advanced age of the birds and relatively large size flocks.

Table 3: Predicting drop in egg production using Fowl cholera as regressor

Response variable (X_0) = drop in egg production		
Regressors:		
X_1 = Fowl cholera		
Estimators	b_0	b_1
Parameter estimate	59.817143	-16.24429
±SE	00.656206	0.928103
T	91.156000	-17.50268
P	00.0001	0.0530

Adjusted R^2 = 50.88%

Table 4: Efficiency of various morbid organs used as diagnostic tool for diagnosis of Fowl cholera

Morbid material	Efficiency as diagnostic tool (%)
Liver	68.75a
Spleen	31.26b
Bone marrow	0c

Means with different subscripts letter(s) were significantly different at $p=0.05$

Effect of Fowl Cholera on Egg Production: Fowl cholera was found significantly ($p<0.05$) and negatively associated ($b=-16.24429\pm0.928103$) with percent lay (Table 3). Findings suggested that one- percent increase in prevalence of Fowl cholera reduced percent lay of the flock by 16%. Kepetanov *et al.* (2000) reported 15-20% decrease while Kissling *et al.* (1991) reported a drop of 13 % in percent lay amongst the infected flocks.

Efficiency of Various Morbid Organs used as Diagnostic Tools for Fowl Cholera: Comparative efficacy of various morbid organs used as diagnostic tools for Fowl cholera was studied. Liver was found to be the best diagnostic organ (68.75 % efficacy) followed by spleen (31.26% efficacy). No evidence of Fowl cholera was ascertained from bone marrow (Table 4). Contrary to the findings of the present study Rajini *et al.* (1995) Isolated *Pasteurella multocida* from liver, spleen, heart blood and bone marrow as well.

Conclusion

Overall prevalence of Fowl cholera was lower than in most of the reported studies. Significantly higher prevalence of fowl cholera was recorded in non-vaccinated flocks at older ages and in commencing flocks reared in sheds previously exposed to Fowl cholera. Prevalence of fowl cholera resulted in a significant decrease in percent lay of the broiler breeder flocks. Necropsy study indicated liver to be the best diagnostic organ for Fowl cholera. Regular vaccination of the broiler breeder flocks would help in prevention of Fowl cholera.

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