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Prevalence and Economic Losses Due to Infectious Bursal Disease in Broilers in Mirpur and Kotli Districts of Kashmir

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Abstract: A systematic investigation was performed on the outbreaks of Infectious Bursal Disease (IBD) using data compiled during the years 1997 and 1998 from 50 broiler farms in Mirpur and Kotli districts. Average mortality due to IBD was 15.31±1.04% with a coefficient of variation of 48.04%. Farms located at various places and vitamin supplementation had no effect on mortality caused by IBD. Season, floor space/broiler, age of the bird, immunization schedule, interval between two batches, presence of coccidiosis in a flock and hygienic status of the farm had a significant effect ($p<0.01$) on prevalence of IBD. Higher losses ($p<0.05$) were found due to IBD in winter (19.84±2.10%) than those tabulated in spring season (9.00±2.74%). Losses were found to be higher ($p<0.05$) in over crowded houses (20.34±3.93%; <0.09m^2/broiler) than in under (12.56±2.53%; >0.09m^2/broiler) or optimally utilized housing (13.04±1.06%; 0.09m^2/broiler). Significantly higher ($p<0.05$) losses were found in broilers at the age above 32 days (17.66±1.51%) than in broilers at 19-23 days of age (12.42±1.97%). Prevalence of IBD was higher ($p<0.05$) in those flocks immunized only once in their production life (23.03±1.27%) than in those produced under a standard immunization schedule (7.61±4.89%). Losses due to IBD were also higher when the duration between two batches was one week (22.28±10.28%) than at four week duration between two batches (12.80±2.78%). Insignificant differences were assessed in losses due to IBD when inter flock interval was either 2 or 3 week periods. Significantly higher ($p<0.05$) losses were found due to IBD in flocks experiencing coccidiosis problem (17.90±1.20%) than those having no coccidiosis problem before the onset of IBD (12.73±1.85%). Losses were less in flocks maintained under good hygienic conditions (6.03±1.33%) than those under poor hygienic conditions (21.63±2.19%). Mean economic losses due to IBD per broiler flock of 1734.50±119.91 and a flock of 1000 birds were Rs. 7846.87±1169.81/ and Rs. 4523.99±447.56/, respectively. Economic losses/year for the aforementioned flocks was Rs. 31701.38±2345.36/- and Rs. 18276.96±2388.91/-, respectively. Optimal utilization of floor space/broiler, protection of birds from extreme climatic conditions, following recommended immunization schedule, maintenance of good hygienic conditions at the farm and a flock interval of at least more than one week are suggested as important factors for reducing losses due to IBD in broilers in Mirpur and Kotli districts of Kashmir.

Key words: Bursal disease, hygiene, flock interval, coccidiosis

Introduction

Infectious Bursal Disease (IBD) commonly known as Gumboro disease is one of the most prevalent diseases in broilers causing severe losses (Singh, 1994, 46.2%; Tsai and Lu, 1993, 45.1%; Anjum *et al*., 1993, 34%). The disease could occur at any stage of life in broilers, however, higher incidence has been reported at an earlier (19-20 days) as compared to later stages of broiler's life (29-30 days; Braunius *et al*., 1990). Anjum *et al*. (1993) also reported that broilers vaccinated against IBD above 10 days of age developed improved immunity than those vaccinated at an earlier age. Improved care of the flock with avoidance of stressful conditions and appropriate immunization could effectively control the outbreak of Gumboro (IBD) in broilers as has also been reported by Farooq *et al*. (2002). Poor hygienic conditions, inappropriate stocking density and concurrent infections with *E. coli*, coccidiosis and other bacterial infections (Singh *et al*., 1994) favored incidence of IBD. Thus, efforts shall be made to provide better management and hygienic conditions thereby, avoiding undue risks of IBD. The present study was an effort to study prevalence and losses due to IBD in broilers and suggest effective strategies for its control in the future.

Materials and Methods

Records maintained at 50 broiler farms in Mirpur and Kotli district of Kashmir were examined during the years 1997 and 1998 to investigate prevalence and economic losses due to Infectious Bursal Disease (IBD). Information on farm location, flock size, number of dead birds, date of disease occurrence, age of the bird at the time of onset of disease, vaccination schedule, given floor space/broiler, vitamin supplementation, presence of coccidiosis in the flock before the onset of IBD, duration between two batches and cost incurred on broilers at various stages of life during which mortality

occurred were recorded. Hygienic status of the farm was extracted from house and floor construction, vicinity of the farm, distance between sheds or other dwellings, house conditions, all in all out system of broiler marketing and other cleanliness and disinfection procedures or measures taken for keeping broilershealthy. Keeping in view the aforementioned information and their application at the farm, the farms were categorized as poor, average and good. Sheds were categorized at a given space/broiler as over (<0.09m^2 floor space/broiler), under (>0.09m^2 floor space/broiler) or optimally utilized (0.09 m^2 floor space/broiler).

Economic losses per flock for each farm were calculated by following equation:

Economic losses = cost at various stages of life per broiler x No. of dead broilers.

Similarly, economic losses/year was calculated by multiplying the aforementioned formula with number of batches/year. Also, economic losses per broiler and per 1000 broilers/flock and economic losses for the whole year were worked out.

The effect of floor space/broiler, season of occurrence, hygienic status of the farm, immunization schedule, age of the broiler, farm location, vitamin supplementation, presence of coccidiosis in the flock at the time of disease outbreaks and duration between two batches on losses due to IBD in broilers, following statistical model was constructed adopting the procedure of Steel and Torrie (1981);

$Y_{ijklmnopqr} = \mu + a_i + b_j + c_k + d_l + e_m + f_n + g_o + h_p + y_q + z_{ijklmnopqr}$

Where,

$Y_{ijklmnopqr}$ = the response variable (IBD),

μ = the population constant common to all observations,

a_i = the effect of I-th floor space/broiler;

i = over-crowded (<0.09 m^2 floor space/broiler), under- utilized (>0.09 m^2 floor space/broiler) and optimally utilized (0.09 m^2 floor space/broiler),

b_j= the effect of j-th season;

j = spring (March through April), summer (May through August), fall (September through October) and winter (November through February),

c_k = the effect of k-th hygienic status of the farm;

k = average, poor and good,

d_l = the effect of l-th vaccination schedule;

l = irregular vaccination (one vaccine and second only at the onset of disease), vaccination only once and scheduled vaccination (first vaccine at the age of day 9-12 and second at day 24-28 against IBD,

e_m= the effect of m-th age of the broiler; m= ≤23 days (group I), >23-28 days (group II), >28-32 days (group III) and >32 days (group IV),

f_n = the effect of n-th farm location; m = farms located in hilly areas and farms located in plain areas,

g_o= the effect of o-th vitamin supplementation before or after vaccination;

o = no vitamin supplemented before and after vaccination, vitamins supplemented after vaccination only and vitamin supplemented before and after vaccination as well,

h_p = the effect of p-th presence of coccidiosis at the onset of IBD;

p = no coccidiosis at the time of onset of IBD and coccidiosis present at the time of onset of IBD,

y_q = the effect of y-th duration between two batches;

y= ≤07 days, >07≤14 days, >14≤21 days and >21 days

$z_{ijklmnopqr}$ = random residual term, assumed to be Normally Identically Independently Distributed (NIID) with mean zero and unit variance.

Results and Discussion

Overall mortality due to IBD in Mirpur and Kotli districts was 15.31±1.04% with a coefficient of variation of 48.04% (Table 1). Sulochana and Lalithakunjamma (1991) reported smaller losses (9%) whereas, Aunjum *et al.* (1993; 26.83%) and Singh *et al.* (1994; 35.65%) reported higher losses in broilers due to IBD than the present findings. These conclusions from the present study could however, be considered high for any single disease of chicken. Because, increase in mortality from 2.5 to 10% resulted in lower profits (Kitsopanidis and Manos, 1991).

Location of the farm and vitamin supplementation had no effect on mortality caused by IBD, whereas, season had a significant effect ($p<0.02$) on it. Losses were significantly higher ($p<0.05$) in winter (19.84±2.10%) than in spring season (9.00±2.74%). Insignificant differences were found in losses during fall and summer season (Table 2). The smaller losses during spring season could be attributed to more favorable climatic conditions than any other season of the year.

Immunization practice had a significant effect ($p<0.01$) on losses due to IBD. Losses due to IBD were lower ($p<0.05$) in those flocks having a scheduled vaccination program (7.61±4.89%) than those having an irregular vaccination program (23.03±1.27%; Table 2). Similarly, higher losses were found in broiler flocks vaccinated only once for IBD (17.75±1.90%). Anjum *et al.* (1993) also reported severe outbreak of IBD in non-immunized flocks than in immunized flocks. Birds following due schedule could have developed more resistance and better immunity against IBD than others and were thus, less prone to infectious diseases, especially IBD.

Age of the bird had a significant effect ($p<0.02$) on prevalence of IBD. Significantly higher ($p<0.05$) losses were found in broilers at the age of above 32 days (17.66±1.51%) than in broilers at 19-23 days of age (12.42±1.97%; Table 1). The findings suggested a consistent increase in losses due to IBD with the advancement in age of the broiler. Anjum *et al.* (1993),

Table 1: Mortality and economic losses due to IBD in broilers in Mirpur and Kotli districts of Kashmir

Variables	Mean±SE	CV(%)
Average flock size	1734.50±119.91	48.88
Mortality (%)	15.31±1.07	48.04
Economic losses per flock of 1734.50 broilers (Rs.)	7846.87±1169.81	79.38
Economic losses per year on average flock size of 1734.5 broilers (Rs.)	31701.38±2345.36	56.78
Economic losses per 1000 broiler flock (Rs.)	4523.99±447.56	112.64
Economic losses per 1000 broiler flock per year (Rs.)	18276.96±2388.91	80.29
Percent losses due to IBD at various stages of life		
≤23 days	12.42_b±1.97	39.4
>23-28 days	14.83_b±3.13	45.53
>28-32 days	16.34_a±4.31	32.15
>32 days	17.66_a±1.51	15.71

Means with different subscripts were significantly different at $\alpha = 0.05$

Table 2: Mean comparisons of per cent mortality caused by IBD in broilers in Mirpur and Kotli districts of Kashmir

Variables	Mean±SE (%)	CV(%)
Season		
Spring	9.00_c±0.20	23.73
Summer	15.91_b±2.56	49.39
Fall	16.48_b±2.74	33.28
Winter	19.84_a±1.23	17.52
Farm Location		
Hilly area	15.13±1.54	26.93
Plain area	15.49±1.12	50.80
Duration between two batches		
≤07 days	22.28_a±10.3	49.35
>07≤14 days	15.79_b±2.78	34.23
>14≤21 days	17.14_b±2.14	43.72
>21 days	12.80_c±2.78	23.27
Vitamins supplementation		
No vitamin given	16.86_a±3.05	54.40
Vitamins given only after vaccination	14.95_a±1.07	46.98
Vitamins given before and after vaccination	14.42_a±1.19	48.34
History of coccidiosis		
Coccidiosis prevalent at the onset of IBD	17.90_a±1.10	11.27
No coccidiosis in the flock at the onset of IBD	12.73_b±1.85	41.10
Floor /broiler		
Under utilized (>0.09m^2/broiler)	20.34_a±3.93	34.81
Over utilized (<0.09m^2/broiler)	12.56_b±2.53	53.67
Optimally utilized (0.09m^2/broiler)	13.04_b±1.06	43.75
Hygienic condition		
Poor	21.63_a±2.19	31.84
Average	18.28_b±2.55	52.32
Good	6.03_c±1.33	50.00
Vaccination schedule		
Scheduled	7.61_c±4.89	47.28
Irregular	17.75_b±1.90	44.83
Only once for a flock	23.03_a±1.27	92.81

Means with different subscripts for various categories across the columns were significantly different at $\alpha = 0.05$

reported that broilers were more susceptible to IBD at the age between 4-8 weeks than at any other stages of life. Braunius *et al.* (1990) also reported higher incidence of IBD (9.2%) at later stages of broiler's life.

Concurrent infection of coccidiosis in a flock had a significant effect (P<0.01) on the prevalence of IBD. Significantly higher (p<0.05) losses due to IBD were found in flocks having coccidiosis problem (17.90±1.20%) than those having no concurrent infection of coccidiosis before the onset of IBD (12.73±1.85%; Table 2). Findings of the present study are in agreement with Singh *et al.* (1994) who reported that concurrent infections with *E. coli*, coccidiosis and other bacterial infections favored incidence of IBD. The findings therefore suggested that stressful conditions resulting from coccidiosis, in which the birds could have been exposed more and any disease attack may be probable.

Duration between two batches had a significant effect (p<0.03) on prevalence of IBD. Losses due to IBD were higher when the duration between two batches was one week (22.28±10.28%) than at four week inter flock interval (12.80±2.78%). Non-significant differences were found in losses due to IBD when inter flock interval was either 3 or 4 weeks (Table 2). One-week flock interval is the minimum period and in a climate with severe winter conditions the farmers may not be able to effectively disinfect and clean poultry housing or get it ready for the commencing flock within a shorter period. On the other hand, losses due to IBD were lower in flocks provided with a 4 week inter flock interval, however this duration is not admissible because it will keep the house depopulated for a longer period and would increase total cost of production per bird per year. A better option is to restrict the flock interval to two weeks however; efforts shall be made for ensuring optimal health care and favorable environment to avoid any stress or unsanitary conditions exposing broilers to diseases.

Floor given space/broiler had a significant effect (p<0.01) on prevalence of IBD. Losses were found to be higher (p<0.05) in overcrowded houses (20.34±3.93%) than in

under (12.56±2.53%) or optimally utilized houses (13.04±1.06%; Table 2). The higher losses in overcrowded houses could possibly be related to the stressful conditions resulting from overcrowding of the birds, which could cause the birds to fight at several fronts, than in an under or optimally utilized housing situation.

Hygienic conditions of the farm had a significant effect ($p<0.01$) on prevalence of IBD. Significantly higher ($p<0.05$) losses were observed in flocks maintained under poor hygienic conditions (21.63±2.19%) than those maintained under prime hygienic conditions (6.03±1.33%; Table 2). The smaller losses in flocks maintained under good hygienic conditions could probably be due to the favorable and healthy environment at the farms discouraging microbial propagation.

Economic losses due to IBD: Mean economic losses due to IBD per average broiler flock of 1734.50±119.91 birds in Mirpur and Kotli districts of Kashmir were Rs. 7846.87±1169.81/-, whereas, mean economic losses per year for the aforementioned flock were Rs. 31701.38±2345.36/- (Table 1). These losses represented Rs. 4523.99±447.56/- and Rs. 18276.96±2388.91/- as amount of rupees loss per flock and per year for 1000 broilers, respectively. The findings suggested a higher loss in rupees due to IBD in Mirpur and Kotli districts of Kashmir, which could reduce net income. Thus, effective measures like appropriate immunization and maintenance of better hygiene and management should be ensured to increase profitability from broiler flocks in Kashmir.

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