PREVALENT DISEASES AND OVERALL MORTALITY IN BROILERS

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ABSTRACT

Records from 62-broiler farms located in Swat, North West Frontier Province (NWFP), Pakistan were collected during the year 1998 to investigate prevalent diseases and overall mortality in broilers. Losses due to Hydro-pericardium syndrome (HPS) were the highest (17.05 ± 2.08%) and the lowest due to coccidiosis (9.39 ± 3.82%). Non-significant differences existed in mortality caused by Newcastle, IBD and yolk sac infection. Differences in losses caused by infectious coryza, enteritis and coccidiosis were also non-significant. Average overall mortality was 13.05 ± 1.16%, representing 7.59 ± 0.46% losses from day-1 to day-14 and 18.52 ± 0.95% from day-15 till marketing of broilers (42-50 days). Lower ($p<0.05$) overall mortality was observed in broilers reared on well-finished concrete floors (12.43 ± 1.45%) than in those on brick+mud made floors (14.36 ± 1.55). Higher ($p<0.05$) overall mortality was found in overcrowded houses (15.60 ± 5.62%) than in optimally utilized houses (10.69 ± 1.51%). Overall mortality was higher ($p<0.05$) in flocks under substandard vaccination schedule (15.92 ± 1.55%) than in those maintained under standard vaccination schedule (10.20 ± 1.21%). Overall mortality was higher (21.11 ± 3.39%) when the interval between two batches was ≤ 7 days than 16-20 days (5.72 ± 3.01%). Lower ($p<0.05$) overall mortality was found in broilers maintained under good hygienic (11.59 ± 1.93%) and sanitary conditions (10.82 ± 1.16%) as compared to those under poor hygienic and sanitary conditions ((14.12 ± 2.81% and 15.15 ± 1.68%, respectively). Maintenance of broilers under good hygienic conditions on well finished concrete floor, providing the required space/broiler, following recommended vaccination schedule without HPS vaccine and keeping 8-20 days interval between two batches were suggested as key factors in reducing mortality among broilers in Swat.

Key Words: Mortality, diseases, managemental factors, broilers

INTRODUCTION

Because of the delicate nature of broiler birds, death rates could be higher in broilers if produced in an unfavorable environment under poor hygienic conditions (Farooq *et al.*, 2001). For economical production, mortality in broilers should be in the range of 2-5% (Kitsopanidis and Manos, 1991). However, higher mortality in boilers (6.13%) than that suggested by Kitsopanidis and Manos (1991) has been reported by Asghar *et al.* (2000) in Mardan, Pakistan. The probable causes for higher mortality in broilers could be infections or some predisposing factors like overcrowding, filthy environment (unhygienic conditions), inappropriate vaccination and stressful conditions leading to severe losses (Mukherjee and Khamapurkar; 1994). Thus, efforts are needed to provide a healthy rearing environment to broilers for maximum profitability.

Disease out-breaks could be one of the major factors resulting in higher mortality in broilers. Among various prevalent diseases in broilers, Infectious Bursal Disease (IBD) or Gumboro disease has been reported to cause severe losses (Tsai and Lu, 1993, 45.1%; Anjum *et al.* 1993, 34%). Such losses in broilers could more effectively be controlled through better care of the flock, avoiding stressful conditions and appropriate vaccination (Anjum *et al.*, 1993). Newcastle disease has been reported to cause 5-51.5% losses in broilers (Anjum *et al.*, 1993; Saidu *et al.*, 1994). Hydro-pericardium syndrome is another problem, influencing severe losses in broilers (20-30%; Khattak *et al.*, 1991; 46.6%; Akhtar *et al.*, 1992 and 17.83%; Ahmad *et al.*, 1995). Coccidiosis has been reported to cause 4.8 to 7.6% (Mahajan *et al.*, 1994) or 11.35% losses (Khattak *et al.*, 1991) in broilers, probably, because of higher sporolation of oocysts in a poorly managed house and filthy environment. Bhatti *et al.* (1989) reported yolk sac infections, coryza and enteritis to cause 6.52, 4.02 and 8.44% mortality, respectively in broilers. The present study was undertaken to investigate overall mortality and prevalent diseases in

broilers and work out effective measures for preventing losses in future.

MATERIALS AND METHODS

Information from 62-broiler farms in Swat, NWFP, Pakistan, was collected during the year 1998 to investigate overall mortality and prevalent diseases in broilers. Data regarding flock size, shed capacity, mortality, disease diagnosed, vaccination practice, interval between two batches and number of flocks per year, were collected. Information about other parameters like hygienic status of the farm, material used in house and floor construction, distance between sheds or other dwellings, house conditions, all-in and all-out system of rearing broilers, cleanliness and disinfection procedures or measures taken for keeping broilers healthy and cleanliness of houses/equipments was collected through farm visits. On the basis of aforementioned criteria and their application at the farm, hygienic status of the farm was categorized as poor, average and good. Density of the broilers in a shed was assessed on the basis of number of broiler/m^2 floor area. The sheds were then categorized as utilized optimally (0.09m^2 space/broiler), under-utilized (more than 0.09m^2 space/broiler) or overcrowded (less than 0.09m^2 space/broiler).

Vaccination criterion was defined as standard, substandard and partial on the basis of recommended vaccination schedule in the area by the field staff of reputable chick suppliers and chalked out at the poultry farm of NWFP, Agricultural University, Peshawar. Broilers vaccinated at day-7 and day-24th for Newcastle Disease (ND), and at day-12 and day 28th for Gumboro or Infectious Bursal Disease (IBD) were regarded as those produced under standard vaccination schedule. Broilers either vaccinated for Hydro-Pericardium Syndrome (HPS) along with the standard vaccination procedure and /or using the aforementioned vaccines in an irregular manner were regarded as broilers produced at a substandard vaccination schedule. Those broilers vaccinated twice (each one for ND and IBD) during the whole rearing period were termed as broilers produced under partial vaccination schedule.

The data were analyzed, using univariate analysis and General Linear Model (GLM) procedures (Steel and Torrie, 1981). The effect of floor space/broiler, hygienic condition of the farm and vaccination schedule on overall mortality in broilers was studied by adopting the following statistical model;

$$Y_{ijklm} = \mu + a_i + b_j + c_k + (axb)_{ij} + (axc)_{ik} + (bxc)_{jk} + e_l + f_{ijklm}$$

Where,

Y_{ijklm} =m-th observation on mortality in broilers produced under i-th hygienic conditions of the farm, j-th vaccination schedule, given k-th floor space/broiler in l-th type of house constructed,

μ = Population constant common to all observations,

a_i = the effect of i-th hygienic condition of the farm; i= poor, average and good,

b_j = the effect of j-th vaccination schedule; j = standard vaccination schedule, partial vaccination schedule and substandard vaccination schedule,

c_k = the effect of k-th floor space/broiler; k = shed optimally utilized (0.09m^2 floor space/broiler), under utilized (more than 0.09m^2 floor space/broiler) or overcrowded (less than 0.09m^2 floor space/broiler),

$(axb)_{ij}$ = interactions between i-th floor space/broiler and j-th hygienic conditions

$(axc)_{ik}$ = interactions between i-th floor space/broiler and k-th vaccination schedule

$(bxc)_{jk}$ = interactions between j-th hygienic conditions and k-th vaccination schedule

e_l = the effect of l-th house construction material; m = brick + mud made, mud made only and concrete made,

f_{ijklm}= the residual term associated with each Y_{ijklm}, normally, independently and identically distributed with mean zero and variance 1.

RESULTS AND DISCUSSION

Prevalent diseases

Prevalent diseases recorded in broilers maintained in Swat, as well as mortality occurred due to each disease, are given in Table 1. Type of disease had a significant effect on mortality in broilers. Losses due to Hydro-pericardium syndrome (HPS) were the highest (17.05 ± 2.08%) and the lowest due to coccidiosis (9.39 ± 3.82%). Non-significant differences existed in mortality caused by Newcastle, IBD and yolk sac infection. Differences in losses due to infectious coryza, enteritis and coccidiosis were also non-significant (Table 1). Lower mortality was reported by several authors due to Infectious Coryza (Anjum, 1990; 1.5, and Bhatti *et al.*, 1989; 4.02%) than the present findings. However, Ahmad *et al.* (1995) reported higher losses (11.3%) in broilers due to Infectious Coryza. Higher mortality due to Hydro-pericardium has been reported by several workers

(Akhtar *et al.*, 1992; 46.6%: Khattak *et al.*, 1991; 20-30% and Ahmad *et al.* 1995; 17.83%) than the present findings. The higher incidence of Hydro-pericardium could be attributed to ineffective control on auto vaccine preparation because most of the practitioners in the area were preparing auto vaccines for Hydro-pericardium without any proper facilities or skills. Through scrutiny of the disease history it was revealed that cases of Hydro-pericardium were only observed in flocks which were vaccinated against Hydro-pericardium disease.

On the other hand overall incidence of the diseases in the present findings suggested comparatively higher mortality due to infectious diseases in the project area. This could be attributed to poor health coverage and ineffective control of infectious diseases. Thus, it is important to have a check on such diseases and improve health facilities along with management conditions because most of the diseases related to management were also higher as compared to most of the reported values in literature. The higher rate of Yolk sac infection than that reported in the literature suggested that the broilers were more exposed to stressful conditions in the area. This may be due to overcrowding or substandard care of the broilers during brooding period.

Overall mortality

Overall mortality in broilers was 13.05 ± 1.16%, representing 7.59 ± 0.46% losses from day-1 to day-14 and 18.52 ± 0.95% from day-15 till marketing (Table 1). Samad and Chakraborty (1993) and Asghar *et al.* (2000) reported 6.7 and 6.13% mortality, respectively, which is lower than the present findings. Overall mortality recorded in the present study (13.05 ± 1.16) could be considered higher at any standard when compared with the aforementioned studies and the optimal range (2.5-5%) reported by Kitsopanidis and Manos (1991) for higher profitability in broilers. Thus, efforts should be made to reduce it through better health care and appropriate management of the broilers in the study area.

Floor construction had a significant effect ($p<0.01$) on overall mortality in broilers. Significantly lower ($p<0.05$) overall mortality was observed in broilers reared on well-finished concrete floors (12.43 ± 1.45%) than in those reared on brick+mud made floors (14.36 ± 1.55%, Table 2). Differences in mortality among broilers maintained on mud or concrete made floors were not significant. The higher mortality in broilers reared on brick+mud made floors could probably be due to inefficient or ineffective cleanliness and disinfection of floors as compared to others. The crakes and crevices in brick + mud made floors may not allow the farmers to thoroughly scrub and clean the floor. As a result microorganisms may remain in such cracks and crevices, which could cause problems later when new flock is introduced into the said houses. Farooq *et al.* (2001) also reported poor production performance of broilers on bricks and mud made floors than on well-finished concrete floors. The lower mortality on mud made floors could be due to efficient and easy cleanliness of the floors as compared to brick made floors.

Stocking density in terms of birds/m^2 in a house had a significant effect ($p<0.01$) on overall mortality in broilers (Table 2). Higher ($p<0.05$) mortality was found in broilers maintained in overcrowded houses (15.60 ± 5.62%) than those kept in optimally utilized houses (10.69 ± 1.51%). Non-significant differences were found in mortality among broilers maintained in under or optimally utilized houses. Adams and Craig (1985) and Carey *et al.* (1995) also reported higher mortality in overcrowded houses. The higher losses in houses used beyond their capacity could probably be due the stressful conditions and filthy environment resulting from overcrowding of birds. Standard space requirement for broilers is one sq.ft./bird. An increase in mortality, was also reported by Asghar *et al.* (2000) when less than one sq.ft. space per broiler was provided.

Vaccination practice also had a significant effect ($p<0.01$) on mortality in broilers. Mortality was significantly higher ($p<0.05$) in flocks vaccinated in an irregular manner (15.92 ± 1.55%) than in those vaccinated according to the recommended standard schedule (10.20 ± 1.21%, Table 2). Significant differences also existed in mortality among broilers vaccinated according to the standard schedule or those partially vaccinated. Probably, birds vaccinated according to standard schedule developed more resistance and better immunity against infectious diseases than others. Anjum *et al.* (1993) also reported lower mortality in broilers properly vaccinated against infectious diseases.

Interval between two batches had a significant effect ($p<0.01$) on mortality in broilers. Significantly higher ($p<0.05$) mortality (21.11 ± 3.39%) was found in flocks when the interval between two batches was ≤7 days than in those where duration between two batches was 16-20 days (5.72 ± 3.01%; Table 2). Mortality was more or less randomly distributed when interval between two batches was either 8-15 days or 21-30 days. The random distribution of mortality at the aforementioned intervals between two batches could probably be due to prevalence of infectious diseases in various flocks. However, the higher mortality at ≤7-day interval between two batches suggested such period to be the minimum duration for proper cleanliness and disinfection of the sheds. Naveed (1999) also reported higher mortality in broilers when duration between two batches was less than 7 days. Thus, an interval of 8-15 days between two batches could be more realistic for the farmers to properly clean their sheds.

Table 1: Comparison of mortality due to various diseases of broilers

Diseases	Mean±SE (%)	CV (%)
Hydro-pericardium Syndrome	17.05[a] ± 2.08	32.30
Newcastle disease	15.19[b] ± 4.30	52.84
IBD (Gumboro)	14.96[b] ± 1.32	60.02
Yolk sac infection	13.56[b] ± 1.21	65.56
Infectious coryza	10.65[c] ± 1.82	62.27
Enteritis	10.62[c] ± 6.14	82.57
Coccidiosis	09.39[c] ± 3.82	71.24
Average mortality at earlier stage (1-14 days)	07.59 ± 0.46	94.24
Average mortality at later stages of life (above 14 days till marketing)	18.52 ± 0.95	79.85
Overall mortality	13.05 ± 1.16	64.37

Means with different superscripts differ significantly (P < 0.05).

Table 2: Comparisons of percent mortality in broilers due to different managemental variables

Variables	Mean±SE (%)	CV (%)	Variables	Mean±SE (%)	CV (%)
Flock interval			**Floor construction**		
≤7 days	21.11[a] ± 3.39	54.24	Concrete made	12.43[b] ± 1.45	64.72
8-15 days	11.05[c] ± 1.35	59.22	Brick + mud made	14.36[a] ± 1.55	66.25
16-20 days	05.72[d] ± 3.01	77.12	Mud made	13.18[b] ± 6.12	77.50
21-30 days	14.40[b] ± 2.22	65.11			
Vaccination schedule			**Density of birds/m²**		
Standard	10.20[c] ± 1.21	57.90	Optimally utilized	10.69[b] ± 1.51	67.64
Partial	13.04[b] ± 2.08	54.05	Under utilized	12.78[b] ± 1.36	60.48
Sub-standard	15.92[a] ± 1.53	17.8	Overcrowded	15.60[a] ± 5.62	74.09
Hygienic conditions			**Sanitary conditions**		
Poor	14.12[a] ± 2.81	60.76	Poor	15.15[a] ± 1.68	62.61
Average	13.45[a] ± 1.18	46.90	Average	13.19[b] ± 4.54	58.42
Good	11.59[b] ± 1.93	50.52	Good	10.82[c] ± 1.18	62.15

Means with different superscripts for each variable differ significantly (P < 0.05).

Hygienic and sanitary conditions on the farm had a significant effect ($p<0.01$) on mortality in broilers. Significantly lower ($p<0.05$) mortality was found in broilers maintained under good hygienic (11.59 ± 1.93%) and sanitary conditions (10.82 ± 1.16%) than those under poor hygienic and sanitary conditions (14.12 ± 2.81 and 15.15 ± 1.68%, respectively; Table 2). Differences in mortality among broilers maintained under poor and average hygienic conditions were non-significant. Farooq *et al.* (2001) also reported higher mortality under poor hygiene. The low mortality in flocks maintained under good hygienic conditions could probably be due to better rearing environment for broilers. Interaction of immunization schedule, hygienic condition of the farm and floor space given/broiler also revealed significant effect ($p<0.01$) on mortality in broilers. These findings suggest poor hygiene coupled with overcrowding had more drastic effects on mortality. Similarly, partial vaccination and poor hygiene had more pronounced effects on mortality. The more drastic effects of poor hygiene coupled with overcrowding and partial vaccination could be attributed to filthy rearing environment and in-effective health coverage and management conditions to which the broilers were exposed. Effective vaccination against infectious diseases, antibiotic therapy and cleanliness could reduce incidence of mortality (Mukherjee and Khamapurkar; 1994). Anjum (1990) also recommended effective vaccination for controlling severe death losses in broilers.

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