

PREVALENCE AND RISK FACTORS ASSOCIATED WITH ENTERIC INFECTION IN LAYER CHICKEN*

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ABSTRACT

Enteric diseases of layer chicken are one of the major causes associated with economic losses to layer poultry farmers. An epidemiological investigation was carried out to analyse the role of risk factors associated with economic important enteric diseases viz. colibacillosis, necrotic enteritis, coccidiosis and Newcastle disease. Risk factors associated with disease occurrence were assessed by relative risk (RR) and odds ratio (OR). There was a strong positive association between occurrence of colibacillosis with other diseases, viz necrotic enteritis with age of chicken and concurrent coccidiosis. Similarly there was a strong positive association between the occurrence of coccidiosis with age of chicken and system of management. The occurrence of Newcastle disease was causally associated with the strain of chicken.

Keywords: Enteric infection, layers, risk factors

INTRODUCTION

Poultry industry is facing numerous hurdles by various diseases which are the major limiting factors to its growth. Among the diseases,

enteric infection causes heavy economic losses due to mortality and drop in egg production. The enteric infection is of multifactorial origin usually occurs on combination of environment and managerial factors. The magnitude of economic losses are

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mainly influenced by infectious agents and their spread, virulence of the pathogen, host immunity and health status, climatic variables etc. which play tremendous role on the occurrence of diseases. The occurrence of a disease at either in a flock or individual bird level is estimated in a justified manner when decision is to be made on whether an infectious disease should be considerably important or not, and which measures to be applied to deal with diseases. Such measures include identification of the risk factors and their role on genesis of diseases and effective management of these risk factors which will be really helpful in effective prevention and control of diseases. Hence the study was aimed to assess the role of risk factors in the occurrence of enteric diseases of layer chicken including colibacillosis, necrotic enteritis, coccidiosis and Newcastle disease.

MATERIALS AND METHODS

Sampling of layer chicken

This study involved sixty seven layer farms. Samples were collected including heart blood swab, intestinal contents, scrapings, spleen, brain and lungs from ailing and dead birds. The samples were investigated for the presence of enteric infection which includes colibacillosis, necrotic enteritis, coccidiosis and Newcastle disease.

Prior to sample collection, information on farm management was collected by using a structured questionnaire. The information collected includes data on vaccination, usage of antibiotics, use of foot bath, disinfection, presence of rodents and other farm animals, use of water sanitizers, previous outbreaks of enteric infection, knowledge of spread of enteric infection among farm workers and other biosecurity measures.

Colibacillosis was confirmed by isolation and identification of *E.coli* from heart blood swab as per the methods described by Sharada

and Wilfred Ruban (2010). Necrotic enteritis was confirmed by isolation and identification of *C. perfringens* from intestinal contents and intestinal scrapings as per the methods described by (Malarugan and Rajeswar, 2012). Coccidiosis was confirmed by detection of oocysts in the intestinal contents and morphometry of sporulated oocysts as per the methods described by Haug *et al.* (2008). Newcastle disease was confirmed by reverse transcriptase polymerase chain reaction as per the methods described by Haque *et al.* (2010).

Cross-sectional study was used to investigate the relationship between disease and hypothesized causal factors. Relative risk (RR) and odds ratio (OR) were used to determine the causal association as per the formula described by Martin *et al.* (1994).

For colibacillosis and Newcastle disease, age of chicken, concurrent co infection with other diseases and strain of layer chicken were identified as hypothesized causal factors. In necrotic enteritis, age and concurrent occurrence of coccidiosis and for coccidiosis, age of the chicken, deep litter system of management were identified as hypothesized risk factors associated with their occurrence.

RESULTS AND DISCUSSION

Total number of birds affected, RR and OR values for each of the above diseases and their respective hypothesized risk factors are presented in the table. Relative risk and odds ratio of more than one indicates that there is a positive statistical association between the risk factor and disease. Whereas RR and OR values of <1 indicates that there is negative statistical association between disease and the risk factor Martin *et al.* (1994).

Colibacillosis

In this study, age was not causally associated with the occurrence of colibacillosis.

This is in accordance with the findings of Rashid *et al.* (2013) who reported that no significant difference in the mortality rate of colibacillosis between different age groups of layer chicken.

Previous or concurrent occurrence of other diseases (ND, infectious bursal disease, Infectious laryngotracheitis, *Mycoplasma gallisepticum* infection, chicken infectious anaemia and Marek's disease) were causally associated with the occurrence of colibacillosis in this study. This finding was in agreement with the findings of Lutful Kabir, (2010) who reported that infections with several pathogens, like NDV, Infectious bronchitis virus, *Mycoplasma gallisepticum* play a role in the occurrence of colibacillosis. Someya *et al.* (2007) also reported that *E. coli* may act as either a primary pathogen or cause secondary infections that occur after immunosuppression caused by another bacterial or viral infection.

Strain of layer chicken was not causally associated with the occurrence of colibacillosis and corresponds to the statement of Dhama *et al.* (2013) who reported that colibacillosis is the commonest infectious disease of farmed poultry seen worldwide in chicken.

Necrotic enteritis

Age in layer chicken was causally associated with the occurrence of necrotic enteritis in poultry in this study. Similarly Shukla *et al.* (2007) and Malmarugan *et al.* (2013) reported that outbreak of necrotic enteritis was noticed in 7 to 16 and 7 to 6 weeks old cage reared commercial layer pullets and broilers respectively.

Concurrent occurrence of coccidiosis was causally associated with necrotic enteritis in this study. This is in agreement with the findings of Williams, (2005), Kaledner and Ertas, (2005) and Hermans and Morgan, (2007) who reported that intestinal damage caused by coccidiosis in poultry favours the overgrowth of *C. perfringens*

results in occurrence of NE. Colonization of small intestine by *Eimeria* spp. may lead to intestinal mucosal damage which may then, in turn, provide natural substrates (plasma proteins) required for *C. perfringens* proliferation (Van Immerseel *et al.*, 2009).

Coccidiosis

Age of chicken was causally associated with the occurrence of coccidiosis in this study. This is in accordance with the findings of Shirzad *et al.* (2011) and McDougald and Fitz-Coy, (2008) who reported that coccidiosis was reported in 3-6 weeks age group in chicken. Maximum prevalence of coccidiosis was reported at 41-50 days of age in chicken (Amare *et al.*, 2012).

Deep litter system of management was causally associated in the occurrence of coccidiosis and this is in agreement with the findings of Sharma *et al.* (2013) and Balasubramaniam and Dorairajan, (2009) who reported that birds reared in deep litter system of management are having direct contact with the oocyst contaminated litter and pick up the infection and hence are highly susceptible to coccidiosis.

Newcastle disease

Age (less than 13 weeks) was not causally associated in the occurrence of Newcastle disease in this study. The results obtained in this study are in accordance with the findings of Olabode *et al.* (2012) who reported that prevalence of ND was high in commercial layers of more than 16 weeks age.

Concurrent or previous outbreaks of other diseases were not causally associated in the occurrence of Newcastle disease in this study. Newcastle disease virus is capable of producing mild to severe infections without involvement of other infectious agents. Incidence of ND was

more in babcock strain of chicken when compared to other strains such as lohmann, bovans, hyline etc. This may probably because babcock strain of chicken is most commonly reared when compared to other strain of chicken in Namakkal area.

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Table - Risk factors associated with enteric diseases of layers

Disease	Factors	Categories	Relative Risk (RR)	Odd's Ratio (OR)	Causal association
Colibacillosis	Age	After start of egg production (> 20 weeks of age)	0.61	0.61	Negative
		Before start of egg production (< 20 weeks of age)			
	Other diseases	Colibacillosis with other diseases	2.73	2.76	Positive
		Colibacillosis alone			
	Strain of layer chicken	Babcock	0.83	0.81	Negative
		Other strains (Lohmann, Bovans)			
Necrotic enteritis	Age	Less than 15 weeks of age	5.33	5.43	Positive
		More than 15 weeks of age			
	Coccidiosis	Necrotic enteritis with coccidiosis	3.6	3.74	Positive
		Necrotic enteritis alone			
	Age	Less than 13 weeks of age	3.82	3.92	Positive
		More than 13 weeks of age			
	System of management	Deep litter	4.28	4.58	Positive
		Cage			
Newcastle disease	Age	Before start of egg production (< 20 weeks of age)	0.50	0.50	Negative
		After start of egg production (> 20 weeks of age)			
	Other diseases	Concurrent or previous outbreak of other diseases	0.88	0.88	Negative
		Newcastle disease alone			
	Strain of layer chicken	Babcock	3.5	3.5	Positive
		Other strains (Lohmann, Hyline, Bovans)			