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PREDOMINANCE AND DETECTION OF DIFFERENT *EIMERIA* SPECIES CAUSING COCCIDIOSIS IN LAYER CHICKENS

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ABSTRACT

Poultry sector is not only the source of animal protein it also plays a vital role in the employment generation. This organized and vibrant sector is adversely affected by the protozoan parasites of the genus *Eimeria* which causes Coccidiosis. During the months of July 2009 to June 2010, 500 gut samples of layer chickens along with 250 faecal droppings (litter samples) were collected for the detection of different *Eimeria* species (coccidian parasite) predominance in the different localities of district Muzaffar garh. Four different species of *Eimeria* i.e. *E. maxima,* (30.20%), *E. tenella,* (39.93%), *E. mitis,* (19.13%) and *E. necatrix* (10.74 %) were isolated from 298/500 (59.60%) infected gut samples. The results also indicated that young layer chickens (60.16%) have greater infection ratio as compare with adults (37%). In addition to this it was also observed that highest predominance of coccidiosis was scrutinized during the month of September (73.33%) while lowest during April (42.86%).

Key words: Predominance, eimeria species, coccidiosis, layer.

INTRODUCTION

Poultry sector, is an imperative source of animal protein (meat and egg), has recorded a considerable development in employment generation (directly/ indirectly) for 1.5 million people with stout growth of 8-10 percent during the year 2010-11 in Pakistan. Its share is 24.8 percent in the total meat production of the country (Anonymous, 2011). This organized and vibrant sector is adversely affected by the protozoan parasites of the genus *Eimeria*, which resides and multiplies in intestinal mucosa causing coccidiosis (Hadipour *et al*., 2011); characterized by dysentery, enteritis, emaciation, drooping wings, poor growth, low production (Rehman, *et al*., 2010; Awais *et al*., 2012) with high rate of mortality and morbidity (Shirzad *et al*., 2011). Due to higher stocking densities and intensive husbandry practices, its incidence is being increased in poultry (Nnadi and George, 2010).

Eimeria spp is omnipresent and can survive in infected birds and the environment for long times (McDougald, 2003). It causes high mortality in young chicks because most of the *Eimeria* spp affects birds between the age of 3 and 18 weeks (Nematollahi *et al.*, 2009; Toulah, 2007).

Intestinal tract mucosa of different animals and birds is affected by about 1800 *Eimeria* spp (Haug, *et al.*, 2008) and in the domestic fowl (*Gallus gallus*) nine different *Eimeria* spp are recognized (Morgan *et al.*, 2009). In which *E. brunette*, *E. maxima*, *E. necatrix* and *E. tenella* are highly pathogenic, while *E. acervulina*, *E. mitis* and *E. mivati* are less pathogenic; and *E. praecox* and *E. hagani* are the lesser pathogenic (Nematollahi *et al*., 2008; Jadhav *et al.*, 2011).

Different workers have investigated the predominance of coccidiosis in various classes of poultry birds in the different regions of Pakistan (Ayaz *et al*., 2003; Rehman, *et al*., 2010; Awais *et al*., 2012). The endeavor of this work is to expand the knowledge of the epidemiology of coccidial infections in layer flocks having open sheds by studying the geographical distribution of coccidial infections, predominance, infection levels, and the *Eimeria* species present in layer populations at district Muzaffar garh with reference to age of layer chickens.

MATERIALS AND METHODS

Collection of samples: A total of 500 gut samples of layer birds suspected for coccidiosis were collected randomly in polythene leather bags from different floor systems and poultry farms located at different regions of District Muzaffar garh from July 2009 to June 2010. In addition to this total (n=250) fresh faecal droppings (litter samples) were also collected randomly in sterilized

zipper polythene bags from different floor systems and poultry farms.

During sampling in the field, we orally obtained information from chicken keepers regarding mortality patterns among different age groups, dynamics of flock size, number of eggs laid before incubation, percentage hatch, number successfully brooded and number that attain adulthood. Both types of samples were labeled with necessary information and brought to Poultry production Lab Muzaffar garh immediately for further analyses.

Sample examination: All the intestines and caeca were opened and their contents (faeces) were collected in a beaker. The faeces were macerated overnight in potassium dichromate solution at 37^{o}C. The suspension was filtered through a muslin cloth and allowed to sediment. The supernatant was discarded and the oocysts in the sediment were separated by floatation method in saturated sodium chloride solution. They were examined microscopically and the different *Eimeria* species were identified on the basis of shape and size of sporocysts and sporozoites (Levine, 1985). The litter samples were processed for the isolation of *Eimeria* species according to the method described by Levine (1985).

RESULTS AND DISCUSSION

298 out of 500 gut samples of layer chicken were found positive and predominance of coccidiosis was 59.60% (298/500). The infection was observed all around the year (Table I) but the intensity was higher in the months of September (73.33%) and October (70%) respectively while low in the month of April (42.86%). This may be due to high level of humidity combine with temperature in these months of the year as shown in the table below, *E. tenella* had the highest predominance rate (39.93%), followed by *E. maxima* (30.20%) in layer chickens (Table II) while the predominance of coccidial infection among adult layer chickens (6 weeks and above) was 37% and among the younger layer chickens (3-4 weeks) was 74% (Table III). These results are in concurrence with the report of (Muazu *et al*. 2008) which stated that the predominance of coccidial infection among adult bird was 36.7% and among the younger birds was 52.9%. This rate is higher as compared to result of other survey in Nigeria that (Fabiyi, 1984) reported predominance 30% and also stated that coccidiosis has been identified in all parts of the world as a deadly disease of flocks, with resultant economic losses.

Month	**Temperature (C)**		**Humidity (%)**	
	Minimum	Maximum	Minimum	Maximum
July 2009	25.0	44.5	18	68
August	25.8	42.0	39	85
September	21.3	39.5	38	89
October	13.0	38.5	35	91
November	6.8	32.0	33	95
December	3.4	27.2	27	93
January 2010	3.5	24.2	34	89
February	4.8	29.4	23	93
March	11.5	39.0	24	94
April	10.0	44.5	9	79
May	21.5	49.5	12	66
June	25.0	45.5	18	68

Reference: Office of District Officer, Agriculture Muzaffar Garh

Table I: Predominance of Eimeriosis in suspected guts of layer chickens during different months

Sr. No.	**Months**	**No. of gut samples examined**	**No. of gut infected**	**Predominance %age**
1	July 2009	40	27	67.50
2	August	35	20	57.14
3	September	45	33	73.33
4	October	30	21	70.00
5	November	45	27	60.00
6	December	50	32	64.00
7	January 2010	55	35	63.63
8	February	45	24	53.33
9	March	50	28	56.00
10	April	35	15	42.86
11	May	30	16	53.33
12	June	40	20	50.00
	Total	500	298	59.60%

The result obtained in this work associated with the four species of *Eimeria* support the statement of (Khan *et al*., 2006) which identified the *E. maxima*, *E. tenella*, *E. mitis* and *E. necatrix* from poultry litter. On the other hand (Hadipour *et al*., 2011) reported that at least four species of Eimeria (e.g., *E. tenella, E. acervulina, E. necatrix* and *E. maxima*) were found in the litter of flock while the *E. tenella* was the most rampant species (24%) followed by *E. acervulina* (18%), *E. necatrix* (12%), and *E. maxima* (10%).

The results of this study reveal that all ages of poultry are susceptible to coccidiosis but younger birds are more susceptible to infection than older birds and usually resolve itself around 6-8 weeks of age. These upshots are in accord with the conclusions of (Omer *et al*., 2011), who has also observed the same pattern of infection in the Farasan gazelles infected with the single species of *Eimeria*.

Table II: Predominance of different *Eimeria* species in layer chickens at Muzafar garh district

Months	No. of infected samples	*E. maxima*		*E. tenella*		*E. mitis*		*E. necatrix*	
		Sample +ve.	% Predominance	Sample +ve	% Predominance	Sample +ve	% Predominance	Sample +ve	% Predominance
July 2009	27	7	25.93	13	48.14	7	25.93	0	0.00
August	20	5	25.00	6	30.00	4	20.00	5	25.00
September	33	10	30.30	12	36.36	6	18.18	5	15.16
October	21	6	28.57	11	52.38	3	14.29	1	4.76
November	27	11	40.74	10	37.04	3	11.11	3	11.11
December	32	8	25.00	15	46.87	7	21.88	2	6.25
January 2010	35	11	31.43	14	40.00	4	11.43	6	17.14
February	24	10	41.67	8	33.33	4	16.67	2	8.33
March	28	7	25.00	11	39.29	5	17.86	5	17.85
April	15	5	33.33	6	40.00	4	26.67	0	0.00
May	16	4	25.00	5	31.25	6	37.50	1	6.25
June	20	6	30.00	8	40.00	4	20.00	2	10.00
Total	298	90	30.20	119	39.93	57	19.13	32	10.74

Table III: **Predominance of coccidiosis in different age groups of layer chickens (faecal droppings)**

		Young layer chicken*			Adult layer chicken*		
Sr. No	No. of faecal samples examined	Faecal sample examined	No. of infected samples	% age	Faecal sample examined	No. of infected samples	%age
1	50	20	12	60.00	30	11	36.67
2	30	12	7	58.33	18	5	27.78
3	35	18	8	44.44	17	8	47.06
4	45	25	17	68.00	20	7	35.00
5	25	15	6	40.00	10	4	40.00
6	35	20	14	70.00	15	6	40.00
7	30	13	10	76.92	17	6	35.29
Total	250	123	74	60.16	127	47	37.00

*Young (3-4 weeks) and *Adult (6 weeks and above)

Management of poultry houses plays a momentous function in the spread of coccidiosis because coccidial oocysts are omnipresent and are easily spread in the poultry house environment. Further, owing to their high reproduction potential, it is very complex to keep chickens coccidia free, especially under current intensive rearing conditions (Adhikari *et al.,* 2008). Oocysts sporulate readily in poultry house litter. However, they can be damaged by bacteria, other organisms and ammonia that are also present and their viability can begin to reduce after three weeks (Jadhav *et al.*, 2011).

Prevalence varied by management and did not vary by flock size (Hadipour *et al*., 2011) while bad management, such as wet litter that encourages oocyst sporulation, contaminated drinkers and feeders, bad ventilation, and high stocking density, can worsen the clinical signs (Ruff, 1993; Al-Quraishy *et al*., 2009). Therefore, coccidiosis can be controlled by good management practices including good ventilation, cleaning and decontamination of drinkers and feeders, dry and clean litter; and proper stocking density in the farm (Jordan, 1995; Al-Quraishy *et al*., 2009).

Conclusion and recommendations: Species of *Eimeria* identified in this study are not the only specie causing the coccidiosis in the layer chickens of the district, there may be other species in another area of the country therefore we advocate the researchers to go around the country for the isolations of other species of *Emeria*.

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