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ORIGINAL ARTICLE

Seasonal prevalence of gastrointestinal parasites in desi fowl (*Gallus gallus domesticus*) in and around Gannavaram, Andhra Pradesh

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Abstract A study was carried out to know the prevalence of gastrointestinal parasites in desi fowl in and nearby villages of Gannavaram, Andhra Pradesh for a period of 1 year. Screening of 492 samples comprising faecal samples and gastrointestinal tracts from freshly slaughtered desi birds at local poultry shops and samples from post mortem examinations at NTR College of Veterinary Science, Gannavaram revealed 63.21 % of gastrointestinal parasites. Faecal samples were examined by floatation technique using salt solution and samples positive for coccidian oocysts were sporulated in 2.5 % potassium dichromate solution for species identification. Adult worms were identified after routine processing and mounting. The species identified includes *Davainea proglottina, Raillietina cesticillus* and *Raillietina echinobothrida* in cestodes (32.47 %), *Ascaridia galli, Capillaria annulata*, *Heterakis gallinarum* in nematodes (39.87 %), *Eimeria tenella, Eimeria acervulina* and *Eimeria necatrix* in *Eimeria* spp. (39.87 %). *Ascaridia galli and R. cesticillus* and *A. galli* and *Eimeria* spp. were common in mixed infection (12.86 %). *Ascaridia galli* was the more prevalent species. No trematode parasite was identified during the study period. Significant ($p = 0.001$) relationship between the seasonality and prevalence of gastrointestinal parasites was observed ($\chi 2 = 17.46$, df = 2). Data revealed high prevalence in rainy season (43.41 %) followed by summer (38.91 %) and winter (17.68 %) seasons for all parasites except for *A. galli* and *C. annulata* infections which were higher in summer season. Results indicated high prevalence of gastrointestinal parasites in desi fowl in study area emphasizing the need of improved management practices of backyard poultry.

Keywords Gastrointestinal parasites · Desi fowl · Prevalence · Season

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Introduction

Parasitic infections are considered to be the major constraint to the economy of farmers by reducing the growth and production of livestock. The desi birds are reared by rural farmers in their backyard without following any scientific feeding practices and medication, where they are more prone to parasitic infection as compared to birds reared on intensive farming though their produce viz. eggs and meat fetches a much higher price than that from commercial poultry. Parasitism inflict heavy economic losses to poultry industry particularly of free range chicken in rural house hold in the form of anorexia, retarded growth, reduced weight gain, decreased egg production, diarrhoea, intestinal obstruction, morbidity and mortality (Anwar et al. 1991; Shah et al. 1999; Dube et al. 2010; Katoch et al. 2012). Parasitism has resulted 17 % reduction of weight gain in growing chicken and 12.5 % reduction in egg production in laying hens in Bangladesh (Bhowmik et al. 1982). Parasitic infection or their concurrent infections also result in immunosuppression, especially in response to vaccines against some poultry diseases (Nandi and George 2010). Prevalence of gastrointestinal parasites in desi fowl has been reported by various workers from different parts of world (Permin et al. 2002;

Ashenafi and Eshetu 2004; Pinckney et al. 2008; Yehualashet 2011; Percy et al. 2012) including India (Sundaram et al. 1962; Devada and Sathianesan 1989; Hange et al. 2007; Puttalakshmamma et al. 2008; Katoch et al. 2012). Although several reports on prevalence of parasites in desi fowl have been reported from different parts of world, it is still necessary to carry out epidemiological studies in other parts of country in view of the changing dynamics of parasitic infections and to follow appropriate control measures. However, reports on prevalence of gastrointestinal parasites in backyard desi fowl of Andhra Pradesh could not be found in the available literature except for few studies in commercial poultry. Hence, a study was undertaken to find out the prevalence of gastrointestinal parasitic infections in desi fowl in and around Gannavaram of Andhra Pradesh for a period of 1 year.

Materials and methods

A total of 492 desi birds' samples were screened in a period of 1 year to know the prevalence of gastrointestinal parasites of desi fowl during different seasons viz. summer (March–June), rainy (July–October) and winter (November–February). Samples comprises faecal samples from different villages and gastrointestinal tracts from freshly slaughtered birds at local poultry shops in and around Gannavaram and samples from post mortem examinations at NTR College of Veterinary Science, Gannavaram. Age and sex of the birds were not taken into account. The intestines were incised longitudinally and were immersed in luke warm water for the release of worms that are embedded in intestinal mucosa. Faecal samples were analyzed by floatation technique using salt solution and small nematodes were identified after temporary mounting. Faecal samples positive for coccidian oocysts were sporulated using 2.5 % potassium dichromate solution for species identification. Identification of helminth eggs and nematode worms was carried out as per the description of Saif et al. (2008). The oocysts were identified based on sporulation time and micrometry (Soulsby E J 1982). Intestinal scrapings were also examined for the presence of tape worms heads and developmental stages of coccidian parasites. Percentage positivity was estimated from total positive cases. Data obtained was classified according to season and was analyzed as per the standard statistical technique (Petrie and Watson 2004).

Results and discussion

The present study revealed 63.21 % (311) of overall prevalence of gastrointestinal parasites in desi fowl. Hange et al. (2007); Pinckney et al. (2008) and Yehualashet (2011) reported 63, 66.9 and 59.64 % of prevalence in Parbhani (India), Grenada and Ethiopia regions respectively. Higher prevalence than in the present study was reported in Bhubaneswar area of Orissa (Manaswini 2007), Bangalore region of Karnataka (Puttalakshmamma et al. 2008) and in tropical area of Jammu (Katoch et al. 2012). The variation in the prevalence of parasitic infection could be due to the difference in climatic conditions of region, availability of intermediate hosts or adoptability of managemental practices as it was also opined earlier (Magwisha et al. 2002; Hange et al. 2007; Percy et al. 2012).

Out of 311 infected birds, 32.47 % were found to be positive for cestodes, 39.87 % for nematodes, 14.79 % for *Eimeria* spp. and 12.86 % for mixed infection. A similar pattern of higher prevalence of nematodes over cestodes has also been reported in Marathwada region of Maharashtra (Naphade and Chaudhari 2013) and in local scavenging chickens in a selected semi-arid zone of Eastern Kenya (Mungube et al. 2008). Contrarily, Pinckney et al. (2008) and (Puttalakshmamma et al. 2008) recorded higher prevalence of cestodes than nematodes in desi birds. Ashenafi and Eshetu (2004) reported high prevalence of cestodes (86.32 %) and nematodes (75.79 %) in backyard chickens in central Ethiopia, than the results of the present study. The variation could be due to less accessibility to intermediate hosts of cestodes and infective stages of nematodes in the environment in the present study and also due to the individual host resistance. The parasites identified in the present study were *Davainea proglottina, Raillietina cesticillus* and *Raillietina echinobothrida* in cestodes (Fig. 1a, b, c), *Ascaridia galli, Capillaria annulata*, *Heterakis gallinarum* in nematodes (Fig. 2a, b, c), *Eimeria tenella, Eimeria acervulina* and *Eimeria necatrix* in *Eimeria* spp. (Fig. 3). *Ascaridia galli and R. cesticillus* and *A. galli* and *Eimeria* spp. were common in mixed infection. Among all helminth parasites identified *A. galli* was the highest (24.11 %) prevalent parasite and *H. gallinarum* was the lowest (5.7 %) (Kaingu et al. 2010; Katoch et al. 2012). Though mortality from *A. galli* is not significant, may result in death of infected bird due to the obstruction of intestinal lumen (Fig. 4). The prevalence of *H. gallinarum* was lower compared to all gastrointestinal parasitic infections, but its economic importance lies in its role as a carrier of protozoan parasite *Histomonas meleagridis* that cause fatal disease in birds. But *H. gallinarum* was the common nematode identified in Bhubaneswar (Manaswini 2007) and Goromonzi District in Zimbabwe (Permin et al. 2002) regions with 52.94 and 64.62 % of infection, respectively.

Among three cestode species identified *R. cesticillus* (16.08 %) was the common parasite than *D. proglottina* and *R. echinobothrida*. This could be due to the presence of

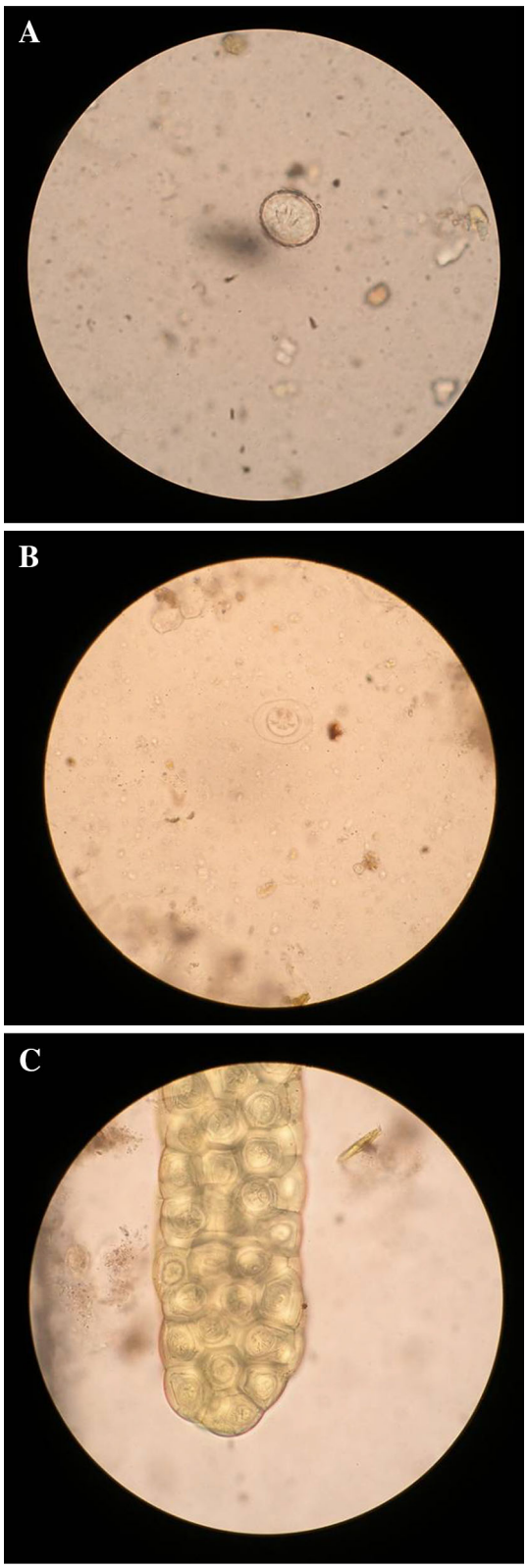

Fig. 1 **a** *Davainea proglottina* (egg with hexacanth embryo), **b** *Raillietina cesticillus* (egg capsule with single egg), and **c**. *R. echinobothrida* (egg capsule with number of eggs)

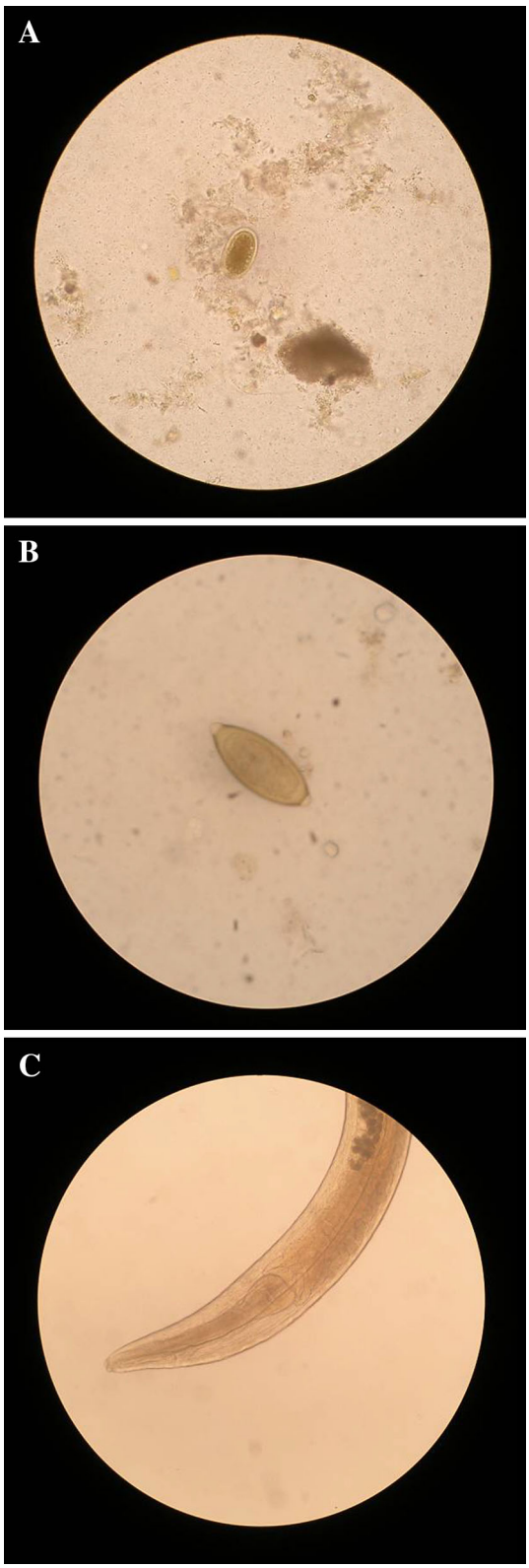

Fig. 2 **a** Egg of *Ascaridia galli*, **b** Egg of *Capillaria annulata*, and **c** Anterior end of *Heterakis gallinarum*

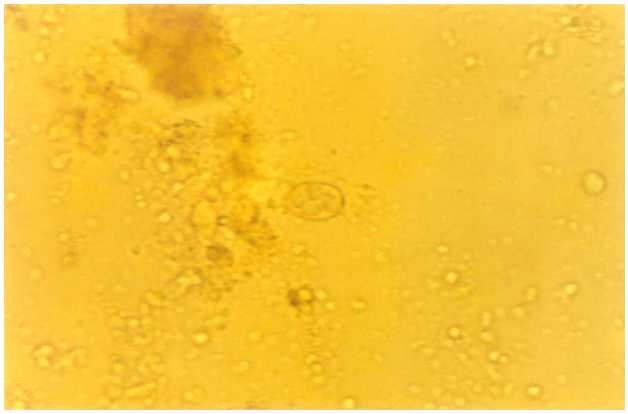

Fig. 3 Sporulated oocyst of *E. necatrix*

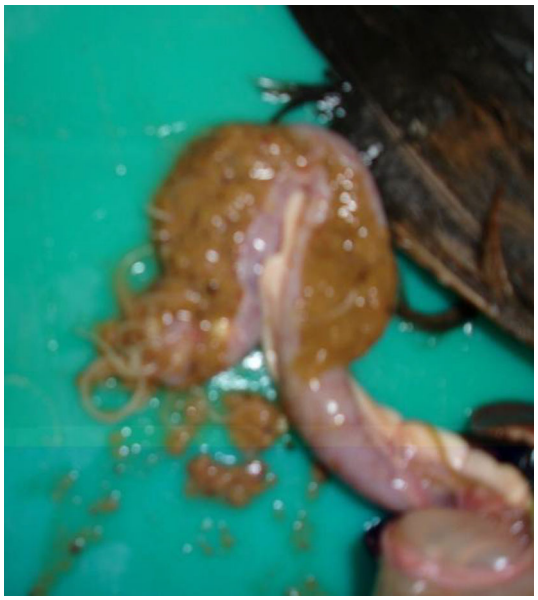

Fig. 4 Intestinal obstruction with *Ascaridia galli*

large number of beetles (intermediate host) in the study area. *Raillietina cesticillus* was also common cestode parasite in West Bengal (Bhowmik and Sinha 1983) and in Jammu (Katoch et al. 2012). Contrary, *R. echinobothrida* was the common parasite in Faisalabad (Shah et al. 1999) and in semi arid zone of Kenya (Mungube et al. 2008). Whereas, in Greneda (Pinckney et al. 2008) and Bangalore region (Puttalakshmamma et al. 2008) *Raillietina tetragona* was the common cestode than *D. proglottina* and *R. cesticillus.* Trematode parasites were not detected during the study period. It might be due to non accessibility and absence of infected snail in the study area and it could also be because of lack of favorable environment for the perpetuation of the vectors of trematodes. Similar observations in desi fowl were also observed earlier (Magwisha et al. 2002; Mungube et al. 2008; Puttalakshmamma et al. 2008). Out of three *Eimeria* spp. identified *E. tenella* was the most prevalent species. Results were in accordance with the findings of Mungube et al. (2008) who reported *E. tenella* as prevalent species out of two coccidia species identified (*E. necatrix* and *E. tenella*) in local scavenging chickens in a selected semi-arid zone of Eastern Kenya.

The present study revealed 12.86 % of mixed infection. Mixed infection caused by one or two gastrointestinal parasites in rural free ranging chicken have been reported (Ashenafi and Eshetu 2004; Hange et al. 2007; Puttalakshmamma et al. 2008). Higher rate of mixed infection than single infection was reported in desi birds in Bhubaneswar (Manaswini 2007) and in Parbhani (Hange et al. 2007). The lower prevalence rate of mixed infection in the present study could be attributed to regional variability.

The seasonal prevalence of gastrointestinal parasites was presented in Table 1. Overall prevalence of gastrointestinal parasitic infection in rainy, summer and winter seasons was 43.41, 38.91 and 17.68 % respectively. Significant ($p = 0.001$) relationship between the seasonality and prevalence of gastrointestinal parasites was observed ($\chi 2 = 17.46$, df $= 2$) rainy season being more favorable for the prevalence of parasites. The results are in accordance with the findings of (Dube et al. 2010) who reported wide distribution of nematode and cestode species in poultry in rural area of Zimbabwe during rainy season. Helminths and coccidia were reported to be significantly

Table 1 Seasonal prevalence of gastrointestinal parasites in desi fowl

Season	No. of samples examined	No. of positive samples	Cestodes				Nematodes				*Eimeria* sp.				Mixed infection		
			DP	RC	RE	**T**	AG	CA	HG	**T**	ET	EA	EN	**T**	AR	AE	**T**
Summer	191	**121**	9	18	8	**35**	39	14	6	**59**	7	2	5	**14**	8	5	**13**
Rainy	187	**135**	16	24	10	**50**	22	11	10	**43**	14	6	3	**23**	12	7	**19**
Winter	114	**55**	7	8	1	**16**	14	6	2	**22**	5	1	3	**9**	5	3	**8**
Total	**492**	**311**	32	50	19	**101**	75	31	18	**124**	26	9	11	**46**	25	15	**40**

The numericals in bold represents the Totals and sub-totals of each category

DP, *Davainea proglottina*; RC, *Raillietina cesticillus*; RE, *R. echinobothrida*; AG, *Ascaridia galli*; CA, *Capillaria annulata*; HG, *Heterakis gallinarum*; ET, *Eimeria tenella*; EA, *E. acervulina*; EN, *E. necatrix*; AR, *A. galli* and *R. cesticillus*; AE, *A. galli* and *Eimeria* spp.

higher during the wet season than during the dry season in a selected semi-arid zone of Eastern Kenya (Mungube et al. 2008). The environmental conditions of the study region are hot and humid that is favorable for development and survival of pre parasitic stages of parasites and for insects, act as vectors for helminthes leading to increased availability of infective stages for backyard poultry (Dube et al. 2010) especially during the process of searching the feed. Contrary, Hange et al. (2007) reported highest incidence of helminth infection in winter season (66.67 %) compared to summer (58.23 %) and rainy seasons (63.07 %). The seasonal prevalence of helminth parasites was highest during summer (93.09 %), followed by rainy (85.27 %) and lowest during winter (74.18 %) in Marathwada region of Maharashtra (Naphade and Chaudhari 2013). Magwisha et al. (2002) reported that climatic conditions (temperature and humidity) may alter the population dynamics of the parasites, resulting in variations in the prevalence and intensity of helminth infections. In the present study the prevalence of cestodes in rainy season was significantly higher ($\chi2 = 7.93$, df $= 2$, $p = 0.019$). There was no seasonal variability in the prevalence of nematodes ($\chi2 = 5.87$, df $= 2$, $p > 0.05$), *Eimeria* spp. ($\chi2 = 3.12$, df $= 2$, $p > 0.05$) and mixed infection ($\chi2 = 1.67$, df $= 2$, $p > 0.05$).

Prevalence of all identified parasitic infection was higher in rainy season followed by summer and winter seasons except for *A. galli* and *C. annulata* infection which was higher in summer season. Similar higher infection of *A. galli* in summer season was also observed in rural chicken in semi arid zone of Eastern Kenya (Mungube et al. 2008), sub humid zone of South Eastern Nigeria (Nandi and George 2010), in District of Hyderabad, Pakistan (Soomro et al. 2010) and in rural district of Zimbabwe (Percy et al. 2012). During summer the climate in and around Gannavaram area is too humid that is suitable for development of egg to infective stage. Moreover the earth worm, paratenic host of *A. galli* and intermediate host of *C. annulata* increases in summer indirectly increasing the intensity of infection (Percy et al. 2012). However, the intensity of *A. galli* was found to be invariable throughout the year by Magwisha et al. (2002).

The high prevalence rate of gastrointestinal parasitism in desi fowl in the present study could be attributed to the fact that the desi fowl were free ranging and have access to infective stages in the environment and to the intermediate hosts like beetles, earth worms, ants etc. in search of feed that are intermediate hosts for helminth parasites. This study on prevalence of gastrointestinal parasites in desi fowl facilitates to device new ways and methodologies to follow the appropriate chemo-immunoprophylactic strategies as one of the control measures.

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References

Anwar AH, Hayat S, Hayat CS (1991) Prevalence of gastrointestinal parasitic fauna of indigenous and exotic layer chickens in and around Faisalabad. Pak Vet J 1:9–12

Ashenafi H, Eshetu Y (2004) Study on gastrointestinal helminths of local chickens in Central Ethiopia. J Vet Med 155(10):504–507

Bhowmik MK, Sinha PK (1983) Studies on the pathology of taeniasis in domestic fowl. Indian Vet J 60:6–8

Bhowmik MK, Sasmal NK, Chakrborty AK (1982) Effect of *Raillietina cesticillus* infection on the meat and egg production of fowl. Indian Vet Med J 6(2):100–102

Devada K, Sathianesan V (1989) Prevalence of *Syngamus trachea* infection in chicken in Kerala. J Vet Parasitol 3(2):135–137

Dube S, Zindi P, Mbanga J, Dube C (2010) A study of scavenging poultry gastrointestinal and ecto-parasites in rural areas of Matebeleland Province, Zimbabwe. Department of Applied Biology and Biochemistry, National University of Science and Technology, Bulawayo. Int J Poultry Sci 9(9):911–915

Hange RR, Raote YV, Jayraw AK (2007) Prevalence of helminth parasites in desi fowl (*Gallus gallus domesticus*) at Parbhani. J Parasit Dis 31(1):61–64

Kaingu F, Kibor A, Shivairo R, Kutima H, Okeno T, Wayhenya R, Kahi AK (2010) Prevalence of gastro-intestinal helminthes and coccidia in indigenous chicken from different agro-climatic zones in Kenya. Afr J Agric Res 5(6):458–462

Katoch R, Yadav A, Godara R, Khajuria JK, Borkataki S, Sodhi SS (2012) Prevalence and impact of gastrointestinal helminths on body weight gain in backyard chickens in subtropical and humid zone of Jammu, India. J Parasit Dis 36(1):49–52

Magwisha H, Kassuku A, Kyvsgaard N, Permin A (2002) A comparison of the prevalence and burdens of helminth infections in growers and adult free range chickens. Trop Anim Health Prod 34(3):205–214

Manaswini D (2007) Incidence of gastrointestinal helminths of desi fowls in Bhubaneswar area. Intas Polivet 8(1):200–201

Mungube EO, Bauni SM, Tenhagen BA, Wamae LW, Nzoika SM, Muhammed L, Nginyi JM (2008) Prevalence of parasites of the local scavenging chickens in a selected semi-arid zone of Eastern Kenya. Trop Anim Health Prod 40:101–109

Nandi PA, George SO (2010) A cross-sectional survey on parasites of chickens in selected villages in the sub humid zones of South-Eastern Nigeria. Department of Animal Health and Production, Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Nigeria

Naphade ST, Chaudhari KV (2013) Studies on the seasonal prevalence of parasitic helminths in Gavran (desi) chickens from Marathwada region of Maharashtra. Int J Fauna Biological Studies 1(2):4–7

Percy J, Pias M, Enetia BD, Lucia T (2012) Seasonality of parasitism in free range chickens from a selected ward of a rural district in Zimbabwe. Afr J Agric Res 7(25):3626–3631

Permin A, Esmann JB, Hoj CH, Hove T, Mukaratirwa S (2002) Ecto-, endo-and haemoparasites in free-range chickens in the Goromonzi District in Zimbabwe. Prev Vet Med 54:213–224

Petrie A, Watson P (2013) Statistics for veterinary and animal science, 1st edn. Blackwell Publishing, Oxford, pp 101–109

Pinckney RD, Coomansingh C, Bhaiyat MI, Chikweto A, Sharma R (2008) Prevalence of gastrointestinal parasites in free-range poultry in Greneda, West Indies. West Indian Vet J 8(1):23–28

Puttalakshmamma GC, Ananda KJ, Prathiush PR, Mamatha GS, Rao S (2008) Prevalence of gastrointestinal parasites of poultry in and around Bangalore. Vet World 1(7):201–202

Saif YM, Fadly AM, Glisson JR, McDonald LR, Nolan LK, Swayne EF (2008) Diseases of poultry, 8th edn. Blackwell Publication, London, pp 1025–1066

Shah AH, Anwar A, Khan MN, Iqbal Z, Qudoos A (1999) Comparative studies on the prevalence of cestode parasites in indigenous and exotic layers at Faisalabad. Department of Veterinary Parasitology, University of Agriculture, Faisalabad, Pakistan. Int J Agri Biol 1(4):277–279

Soomro F, Arijo AG, Bliqees FM, Phulan MS (2010) *Ascarridia galli* infections in local and exotic chickens in district Hyderabad. Proc Parasitol 50:85–90

Soulsby EJL (1982) Helminth, arthopods and protozoa of domesticated animals, 7th edn. Bailliere Tindal and Cassell Ltd, London, pp 765–767

Sundaram RK, Radhakrishnan CV, Padmanabha Iyer R (1962) A note on the common parasitic helminths of fowl in Kerala. Kerala Vet 1(1):17–21

Yehualashet B (2011) A study on the prevalence of helminth parasites in free range (backyard) chicken in selected small holder farms in and around Haramaya. DVM thesis, College of Veterinary Medicine, Haramaya University, Ethiopia